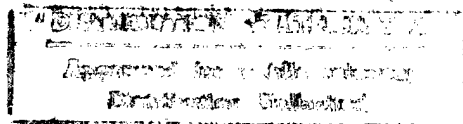


# DEPARTMENT OF DEFENSE IN-HOUSE RDT&E ACTIVITIES



19961104 002

**FY95**

## Management Analysis Report

*Department of the Army*

*Department of the Navy*

*Department of the Air Force*

*DoD Agency (USUHS - AFRR)*



OFFICE OF THE DIRECTOR OF  
DEFENSE RESEARCH AND ENGINEERING  
WASHINGTON, DC 20301-3030

9661 1 E 100

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER  
(Attention: Ms. Gretchen Schlag)

SUBJECT: Distribution of the Fiscal Year 1995 DoD In-House RDT&E Activities  
- Management Analysis Report

In accordance with DoD Directive 5230.24 and prior coordination with your organization, I am forwarding four (4) hard-copies of the recently published FY95 DoD In-House RDT&E Activities - Management Analysis Report;

- two (2) copies for DTIC, and
- two (2) copies to be forwarded to the National Technical Information Service (after DTIC assigns a stock control number to address public distribution requirements).

Distribution statement "A" is appropriate for the attached FY95 report; i.e. "Approved for public release; distribution is unlimited".

We have previously provided DTIC with the FY91, FY92, FY93 and FY94 editions of this report and anticipate publishing the FY96 edition in spring, 1997.

For additional information or copies, please contact Mr. Mark Paulson at (703) 693-0456.

A handwritten signature in cursive script, reading "Lance A. Davis", is positioned above the printed name.

Lance A. Davis

Deputy Director, Defense Research and Engineering  
(Laboratory Management and Technology Transition)

Attachment

# DEPARTMENT OF DEFENSE IN-HOUSE RDT&E ACTIVITIES REPORT

for  
Fiscal Year 1995

Prepared for:

The Office of the Secretary of Defense  
Director, Defense  
Research and Engineering  
The Pentagon  
Washington, DC 20301

## FOREWORD

### Introduction

The DoD In-House Research, Development, Test & Evaluation (RDT&E) Activities Report was started in the mid-1960s by the Office of Laboratory Management within the Office of the Secretary of Defense, at the request of the then Director of Defense Research and Engineering (DDR&E), Dr. John Foster. The annual report has been produced in official form since 1966, and is the subject of a Tri-Service regulation dated October 1, 1981: AR 70-63; NAVCOMPINST 7044.5E and, AFR 80-26.

The DoD In-House RDT&E Activities Annual Report and database project is the DDR&E's central source of information on laboratory status, and serves four essential purposes: (1) since inception, it has been the only compilation of statistics organized by location on DoD RDT&E Activities; (2) it provides the basis for prompt responses to many general queries about DoD RDT&E Activities, without recourse to special surveys, etc.; (3) it provides an historical database which can be utilized for tracing consolidations and organizational changes, and for special analyses and trend studies; and (4) it provides insight into the technical and organizational environment of the DoD laboratories and the financial manpower and facility investments made in them.

The Office of the Deputy Director of Defense Research and Engineering for Laboratory Management and Technology Transition leads a Steering Group which is responsible for the preparation and oversight of the report and its underlying database. The Steering Group is composed of representatives from the offices of the Director of Defense Research and Engineering, the Deputy Assistant Secretary of the Army for Research and Technology, the Chief of Naval Research, the Deputy Assistant Secretary of the Air Force (Research and Engineering), the Director of the Armed Forces Radiobiology Research Institute of the Uniformed Services University of the Health Sciences (USUHS), and the Under Secretary of Defense (Comptroller).

A DoD organizational entity is considered to be a "DoD RDT&E Activity" when it is owned and operated by the Government, and a minimum of 25% of its total effort is devoted to research, exploratory or advanced development, engineering development, demonstration/validation, systems or operational support, or some combination thereof. Examples are a research laboratory; a research, development and engineering center (RDEC), a test center or proving ground, and a multi-functional entity such as a "warfare center." An "In-House" RDT&E Activity is an organization where a minimum of 25% of the in-house manpower and/or 25% of the obligational authority used is devoted to research, exploratory or advanced development, engineering development, etc., conducted **in-house**.

### Structure of Report

Selected data for the In-House RDT&E Activities of the Army, Navy, Air Force and the Uniformed Services University of the Health Sciences are summarized in tables in the first section of the report. Following the tables are individual sections which cover the In-House RDT&E Activities of the three Military Services and USUHS. Each Activity is described in a standard multi-page format.

Activities are listed alphabetically within their respective military departments. A partial organization chart, entitled "Abbreviated Functional Chart - Technical Organizations," appears for each Activity to provide an overview of its technical operations. Funding data are broken down into the standard RDT&E sub-categories: 6.1 - Research, 6.2 - Exploratory Development, 6.3 - Advanced Development, 6.4 - Demonstration & Validation, 6.5 - Engineering and Manufacturing Development, 6.6 - Management Support, 6.7 - Operational Systems Development, and Non-DoD. All zero-filled report data fields reflect a zero amount reported.

Organizational changes for FY95 appear in Appendix A. Appendix B contains definitions of the data elements displayed in this report. Appendix C defines selected abbreviations and acronyms.

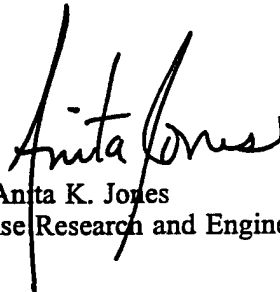


Every effort has been made to provide accurate information. Each submission was reviewed and approved by the head of the reporting Activity. All numbers and statements submitted by each Activity were then thoroughly examined by the members and staff of the Steering Group. Please note, though, that **this report does not reflect the total DoD RDT&E program**. It is also not an accounting or financial management document, but rather a "snapshot " of the operation of many individual Activities. All funding data reflect total obligational authority received in FY95. The data in this report should not be summarized or used for detailed comparative analyses, because the Service labs/centers use a number of different business accounting systems to satisfy their special needs. See Appendix B for further explanations.

The report is used by numerous DoD organizations, as well as various committees of Congress, the Library of Congress and the General Accounting Office. The report provides easily accessible comprehensive and accurate information without frequent querying of field Activities.

This publication should be given widespread distribution in the DoD Laboratories, both as an internal resources reference document at the Director and Commanding Officer level, and as a catalog of general activity at the bench level. It provides laboratory staff an opportunity to familiarize themselves with the functional capabilities of other DoD Laboratories, thereby encouraging scientists and engineers to communicate with their counterparts at other labs on problems of common interest.

In addition, this publication has proven helpful to those in the private sector interested in exploring the potential for technology cooperation/transfer with DoD Laboratories (for example, Cooperative Research and Development Agreements - CRADAs).



Anita K. Jones  
Director, Defense Research and Engineering

Note: This report can be found in the documents section on the DDDR&E/LM&TT WebSite at < <http://www.dtic.mil/labman/> >. Also, for hard copies of this report, contact:

For Government Agencies and contractors:

Defense Technical Information Center (DTIC)  
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8725 John J. Kingman Rd., STE 0944  
Ft. Belvoir, VA 22060-6218  
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Springfield, VA 22161  
703-487-4650

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TABLE 1. ARMY RDT&E ACTIVITIES, PROGRAM AND PERSONNEL DATA, FY 1995															
INSTALLATION	FUNDING DATA (MILLIONS \$)			PERSONNEL DATA											
	TOTAL	IN-HOUSE	TOTALS	TOTALS	IN-HOUSE	RDT&E	TOTAL	TOTAL	PHD	PHD	TOTAL	PHD	ENG	ENG	
Aberdeen Test Center	118.331	74.337	70.445	43.412	141	966	0	6	9	282					
Aeromedical Research Laboratory	8.242	8.176	4.954	4.888	62	40	9	9	3	6					
Armament RDEC	703.509	277.724	344.141	142.991	70	3,904	1	78	41	1,852					
Army Research Laboratory	460.801	252.097	399.172	241.330	85	2,772	10	349	29	1,186					
Aviation RDEC	153.278	57.692	117.465	37.053	15	748	2	26	11	427					
Aviation Technical Test Center	18.251	18.251	14.152	14.152	88	133	0	0	45	40					
Biomedical R&D Laboratory	6.840	4.152	6.139	4.152	0	12	0	1	0	4					
CECOM RDEC	588.813	144.151	304.933	87.235	115	2,291	0	74	39	1,367					
Cold Regions Research & Engineering Lab	41.684	31.254	22.922	15.922	4	265	1	52	3	83					
Construction Engineering Research Labs	83.750	40.514	55.364	25.402	2	375	0	52	2	183					
Dugway Proving Ground	83.567	46.615	57.813	33.244	57	562	0	25	8	152					
Edgewood RDEC	287.044	122.689	151.280	70.922	19	1,066	3	73	2	532					
Inst. of Surgical Research	14.856	14.856	7.758	7.758	191	56	22	7	30	18					
Matériel Systems Analysis Activity	38.067	28.636	29.188	21.485	16	395	0	12	11	292					
Med. Research Inst. of Chemical Defense	36.572	17.539	36.572	17.539	56	159	20	33	4	24					
Med. Research Inst. of Environ. Medicine	9.158	8.480	8.401	7.723	66	81	18	28	11	26					
Med. Research Inst. of Infectious Diseases	25.425	25.305	25.425	25.305	291	215	44	48	5	37					
Missile RDEC	427.880	126.882	292.444	58.349	16	2,069	0	59	11	1,289					
Natick RDEC	68.569	34.166	60.221	27.889	30	527	1	52	8	292					
OPTEC-Test and Experimentation Cmd	129.568	129.568	76.071	76.071	677	502	0	2	11	55					
Redstone Technical Test Center	52.280	52.280	27.463	27.463	0	161	0	1	0	95					
Rsrch Inst. for Behavioral & Social Science	35.077	20.195	27.660	17.935	9	200	0	97	6	19					
Tank-Automotive RDEC	234.150	75.267	158.556	25.093	19	1,304	0	24	19	656					
Topographic Engineering Center	94.939	35.980	33.487	16.447	11	435	1	13	2	260					
Walter Reed Army Inst. of Research	82.155	74.606	61.881	54.332	465	474	170	98	7	105					
Waterways Experiment Station	278.627	166.729	272.664	162.256	6	1,399	0	183	6	510					
White Sands Missile Range	306.763	232.329	267.993	209.776	829	2,370	1	12	201	547					
Yuma Proving Ground	143.125	75.082	93.847	41.755	227	760	0	0	0	113					



TABLE 2. ARMY RDT&E ACTIVITIES, FACILITY DATA, FY 1995										
INSTALLATION	LOCATION	ACRES	SPACE AND PROPERTY					COST (MILLIONS \$)		
			SPACE (THOUSANDS OF SQUARE FEET)					TOTAL	PROP	EQUIP
			LAB	ADMIN	OTHER	TOTAL	REAL			
Aberdeen Test Center	Aberdeen Proving Grd, MD	56,707	120,290	147,541	936,247	1,204,078	56,070	200,689		
Aeromedical Research Laboratory	Fort Rucker, AL	44	96,000	17,500	27,660	141,160	12,246	47,458		
Armament RDEC	Picatinny Arsenal, NJ	5,853	308,822	1,137,989	2,619,000	4,065,811	180,513	199,519		
Army Research Laboratory	Adelphi, MD	1,759	1,482,359	586,926	118,846	2,188,131	586,000	435,200		
Aviation RDEC	St. Louis, MO	0	108,852	64,741	14,730	188,323	6,652	27,758		
Aviation Technical Test Center	Fort Rucker, AL	0	0,000	94,125	233,000	327,125	3,600	153,539		
Biomedical R&D Laboratory	Fort Detrick, MD	0	7,888	5,304	5,552	18,744	0,000	5,039		
CECOM RDEC	Ft. Monmouth, NJ	2,299	421,400	361,900	16,900	800,200	65,600	244,813		
Cold Regions Research & Engineering Lab	Hanover, NH	207	242,177	2,400	66,438	311,015	34,401	27,419		
Construction Engineering Research Labs	Champaign, IL	0	118,896	60,428	29,449	208,773	0,000	20,189		
Dugway Proving Ground	Dugway, UT	798,855	145,000	179,000	2,169,000	2,493,000	147,000	23,000		
Edgewood RDEC	Aberdeen PG, MD	0	840,000	288,000	352,000	1,480,000	84,800	131,988		
Inst. of Surgical Research	Fort Sam Houston, TX	0	39,000	6,000	17,000	62,000	0,000	12,000		
Materiel Systems Analysis Activity	Aberdeen Proving Gnd, MD	4	0,000	115,281	17,064	132,345	3,596	7,790		
Med. Research Inst. of Chemical Defense	Aberdeen Proving Gr, MD	30	37,419	38,433	125,024	200,876	23,400	0,000		
Med. Research Inst. of Environ. Medicine	Natick, MA	0	47,093	5,940	35,714	88,747	25,550	24,020		
Med. Research Inst. of Infectious Diseases	Fort Detrick, MD	150	121,000	78,000	148,000	347,000	23,962	40,306		
Missile RDEC	Redstone Arsenal, AL	4,000	962,000	226,617	143,587	1,332,204	203,000	321,845		
Natick RDEC	Natick, MA	174	307,462	323,528	300,880	931,870	40,903	37,791		
OPTEC-Test and Experimentation Cmd	Fort Hood, TX	22	19,900	41,000	0,000	60,900	6,300	3,000		
Redstone Technical Test Center	Redstone Arsenal, AL	14,000	460,000	52,000	133,000	645,000	146,000	0,000		
Rsrch Inst. for Behavioral & Social Sciences	Alexandria, VA	0	21,500	67,000	12,082	100,582	17,000	19,000		
Tank-Automotive RDEC	Warren, MI	105	442,707	179,569	63,665	685,941	111,660	212,861		
Topographic Engineering Center	Alexandria, VA	0	88,776	35,081	53,134	176,991	22,400	21,423		
Walter Reed Army Inst. of Research	Washington, DC	0	403,544	178,372	151,472	733,388	16,460	62,353		
Waterways Experiment Station	Vicksburg, MS	2,705	2,555,940	234,240	63,730	2,853,910	482,058	480,828		
White Sands Missile Range	White Sands Missile, NM	2,310,798	33,868	910,674	643,855	1,588,397	439,744	422,000		
Yuma Proving Ground	Yuma, AZ	1,009,352	18,200	153,300	1,855,500	2,027,000	112,600	234,618		

TABLE 3. NAVY RDT&E ACTIVITIES, PROGRAM AND PERSONNEL DATA, FY 1995																	
INSTALLATION	FUNDING DATA (MILLIONS \$)				PERSONNEL DATA												
	TOTALS		IN-HOUSE		TOTALS		IN-HOUSE		TOTAL		IN-HOUSE		TOTAL				
	TOTAL	IN-HOUSE	TOTALS	RDT&E	TOTALS	RDT&E	TOTAL	MIL	CIV	PHD	MIL	PHD	CIV	ENG	MIL	ENG	CIV
Naval Aerospace Medical Research Lab	7.096	6.764	7.096	6.764	25	40	10	5	4	5	4	5	4	5	4	5	4
Naval Air Warfare Center	4,781.600	1,618.100	1,393.500	618.700	2,966	18,562	4	233	68	6,824							
Naval Biodynamics Laboratory	7.789	5.725	7.789	5.725	12	30	2	3	0	11							
Navy Clothing & Textile Research Facility	5.650	3.095	2.830	1.330	1	50	0	1	1	32							
Naval Cmd, Control & Ocean Surveillance	1,648.430	629.770	568.710	209.870	111	5,285	2	190	21	2,305							
Naval Dental Research Institute	1.989	1.499	1.842	1.416	27	10	9	4	0	1							
Naval Facilities Engineering Service Ctr.	163.784	78.816	32.892	19.389	21	528	0	22	13	260							
Naval Health Research Center	14.299	5.629	13.032	4.916	22	63	9	12	4	27							
Naval Medical Research Institute	60.964	21.847	50.507	13.860	231	194	56	30	18	53							
Naval Medical Research Unit # 2	4.601	4.459	3.602	3.460	20	98	9	10	3	40							
Naval Medical Research Unit # 3	7.229	7.030	5.865	5.666	31	171	9	17	5	5							
Navy Personnel Rsrch & Development Ctr	30.219	12.513	18.252	8.342	17	141	0	39	5	64							
Naval Research Laboratory	746.900	344.600	585.700	288.700	199	3,356	8	840	38	902							
Naval Submarine Medical Research Lab	4.092	4.092	2.475	2.475	20	33	6	8	0	5							
Naval Surface Warfare Center	2,888.100	1,742.400	961.200	450.900	417	18,420	0	371	80	7,366							
Naval Undersea Warfare Center	1,069.600	507.900	348.400	181.000	285	6,077	1	164	49	2,806							

TABLE 4. NAVY RDT&E ACTIVITIES, FACILITY DATA, FY 1995									
INSTALLATION	LOCATION	ACRES	SPACE AND PROPERTY				COST (MILLIONS \$)		
			SPACE (THOUSANDS OF SQUARE FEET)			TOTAL	REAL		EQUIP
			LAB	ADMIN	OTHER		PROP	REAL	
Naval Aerospace Medical Research Lab	Pensacola, FL	3	102.936	6.648	10.237	119.821	12.838	10.772	
Naval Air Warfare Center	Arlington, VA	1,271,135	8,721.000	2,314.000	14,671.000	25,706.000	1,292.000	1,080.000	
Naval Biodynamics Laboratory	New Orleans, LA	2	25.845	27.907	0.000	53.752	2.263	4.727	
Navy Clothing & Textile Research Facility	Natick, MA	0	12.667	16.000	5.630	34.297	0.000	2.111	
Naval Cmd, Control & Ocean Surveillance	San Diego, CA	3,650	2,819.900	634.700	1,606.700	5,061.300	227.000	209.000	
Naval Dental Research Institute	Great Lakes, IL	0	21.264	6.001	9.318	36.583	5.000	1.006	
Naval Facilities Engineering Service Center	Port Hueneme, CA	33	112.000	129.900	74.500	316.400	7.479	8.700	
Naval Health Research Center	San Diego, CA	0	32.330	12.250	2.200	46.780	0.000	1.896	
Naval Medical Research Institute	Bethesda, MD	7	161.930	63.875	0.000	225.805	8.200	15.316	
Naval Medical Research Unit # 2	Jakarta, Indonesia	0	15.132	11.797	22.330	49.259	1.878	1.989	
Naval Medical Research Unit # 3	Cairo, Egypt	4	68.244	9.058	71.330	148.632	10.600	5.763	
Navy Personnel Rsrch & Development	San Diego, CA	3	55.800	16.400	4.500	76.700	1.170	10.344	
Naval Research Laboratory	Washington, DC	556	3,190.418	225.812	422.367	3,838.597	189.000	369.000	
Naval Submarine Medical Research Lab	Groton, CT	0	44.783	6.233	4.962	55.978	7.657	4.452	
Naval Surface Warfare Center	Arlington, VA	72,523	6,444.000	1,669.000	11,981.000	20,094.000	1,295.000	1,631.000	
Naval Undersea Warfare Center	Newport, RI	2,543	2,876.000	279.000	2,878.000	6,033.000	273.300	678.900	

TABLE 5. AIR FORCE RDT&E ACTIVITIES, PROGRAM AND PERSONNEL DATA, FY 1995													
INSTALLATION	FUNDING DATA (MILLIONS \$)				PERSONNEL DATA								
	TOTAL	IN-HOUSE	TOTALS		TOTAL	IN-HOUSE		TOTAL	IN-HOUSE		TOTAL	IN-HOUSE	
			RDT&E			RDT&E			RDT&E			RDT&E	
Armstrong Laboratory	186.300	48.600		162.300	493		46.900	526		72	134	112	126
Arnold Engineering Development Center	301.184	276.796		241.737	123		219.018	173		0	4	25	60
Development Test Center	549.800	263.100		524.600	4,212		256.200	2,792		0	3	75	347
Flight Test Center	646.705	282.643		584.053	4,432		268.606	3,340		47	16	391	670
Phillips Laboratory	409.100	44.000		399.300	566		43.000	1,228		40	219	292	366
Rome Laboratory	422.446	72.065		324.452	131		58.346	808		4	77	59	428
Wright Laboratory	1,068.900	172.600		1,016.500	390		153.700	2,073		37	219	255	1,168
46th Test Group	64.699	28.551		56.646	186		22.518	289		1	2	25	164

TABLE 6. AIR FORCE RDT&E ACTIVITIES, FACILITY DATA, FY 1995										
INSTALLATION	LOCATION	SPACE AND PROPERTY					COST (MILLIONS \$)			
		SPACE (THOUSANDS OF SQUARE FEET)					REAL			
		ACRES	LAB	ADMIN	OTHER	TOTAL	PROP	EQUIP		
Armstrong Laboratory	San Antonio, TX	96	1,034.000	157.000	1.000	1,192.000	64.860	74.116		
Arnold Engineering Development Center	Arnold Air Station, TN	39,081	1,049.360	374.161	1,261.174	2,684.695	1,287.054	221.004		
Development Test Center	Eglin AFB, FL	463,115	1,801.631	829.156	12,613.444	15,244.231	687.176	409.690		
Flight Test Center	Edwards AFB, CA	297,685	307.691	274.788	9,023.401	9,605.880	756.589	416.000		
Phillips Laboratory	Kirtland AFB, NM	16,620	995.828	652.384	864.459	2,512.671	1,043.200	1,097.500		
Rome Laboratory	Griffiss AFB, NY	1,616	825.000	236.000	438.000	1,499.000	65.000	129.603		
Wright Laboratory	WPAFB, OH	932	1,447.300	671.400	776.386	2,895.086	965.000	2,082.290		
46th Test Group	Holloman AFB, NM	7,052	572.971	55.009	132.641	760.621	238.792	157.441		

TABLE 7. UNIF. SVCS. UNIV. HEALTH SCIENCES (USUHS) RDT&E ACTIVITIES, PROGRAM AND PERSONNEL DATA, FY 1995													
INSTALLATION	FUNDING DATA (MILLIONS \$)				PERSONNEL DATA								
	TOTALS		IN-HOUSE		TOTAL	PHD		PHD		TOTAL	MIL		ENG
	IN-HOUSE	RDT&E	IN-HOUSE	RDT&E		CIV	MIL	CIV	MIL		CIV	MIL	
Armed Forces Radiobiology Rsrch Inst.	12.447	12.447	11.223	11.223	62	103	15	25	8				9

TABLE 8. UNIF.SVCS.UNIV.HEALTH SCIENCES(USUHS) RDT&E ACTIVITIES, FACILITY DATA, FY 1995									
INSTALLATION	LOCATION	ACRES	SPACE AND PROPERTY					COST (MILLIONS \$)	
			SPACE (THOUSANDS OF SQUARE FEET)				REAL	EQUIP	
			LAB	ADMIN	OTHER	TOTAL	PROP		
Armed Forces Radiobiology Rsrch Inst.	Bethesda, MD	10	61.750	34.257	23.908	119.915	14.347	13.380	

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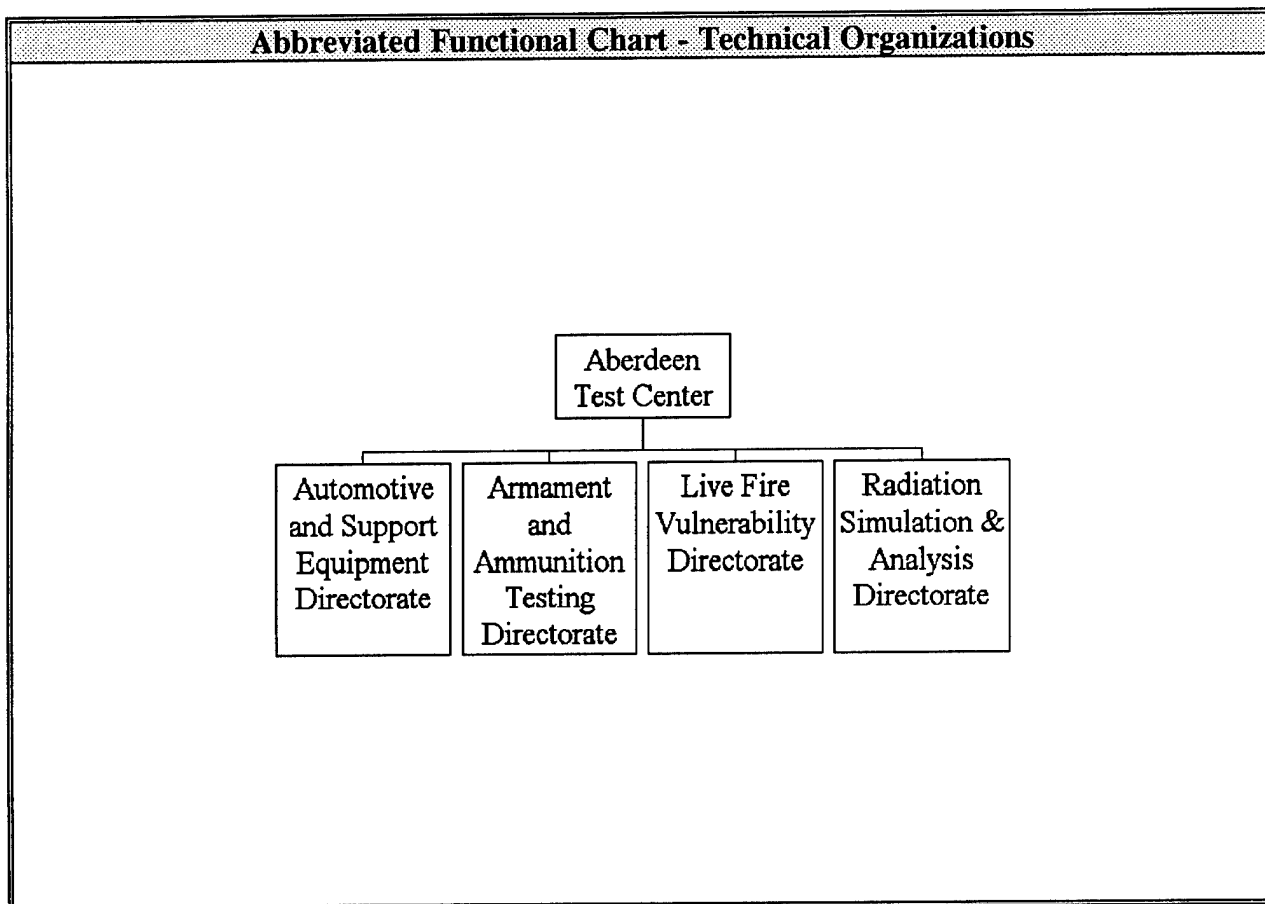
# **DEPARTMENT OF THE ARMY**

## DEPARTMENT OF THE ARMY

The Army's twenty-eight (28) In-House RDT&E Activities are:

Aberdeen Test Center .....	2-2
Aeromedical Research Laboratory .....	2-6
Armament Research, Development and Engineering Center .....	2-10
Army Research Laboratory .....	2-14
Aviation Research, Development and Engineering Center .....	2-18
Aviation Technical Test Center .....	2-22
Biomedical Research & Development Laboratory .....	2-26
CECOM Research, Development and Engineering Center .....	2-30
Cold Regions Research and Engineering Laboratory .....	2-36
Construction Engineering Research Laboratories .....	2-42
Dugway Proving Ground .....	2-46
Edgewood Research, Development and Engineering Center .....	2-50
Institute of Surgical Research .....	2-54
Materiel Systems Analysis Activity .....	2-58
Medical Research Institute of Chemical Defense .....	2-62
Medical Research Institute of Environmental Medicine .....	2-70
Medical Research Institute of Infectious Diseases .....	2-74
Missile Research, Development and Engineering Center .....	2-78
Natick Research, Development and Engineering Center .....	2-86
OPTEC Test and Experimentation Command .....	2-90
Redstone Technical Test Center .....	2-94
Research Institute for the Behavioral and Social Sciences .....	2-98
Tank Automotive Research, Development and Engineering Center .....	2-102
Topographic Engineering Center .....	2-108
Walter Reed Army Institute of Research .....	2-112
Waterways Experiment Station .....	2-116
White Sands Missile Range .....	2-122
Yuma Proving Ground .....	2-126

Aberdeen Test Center



**Aberdeen Test Center**

Aberdeen Proving Grd, MD 21005-5059  
(410) 278-3574

Commander: Colonel Richard O. Bailer  
Technical Dir.: James W. Fasig

**MISSION**

Aberdeen Test Center (ATC) is the most diverse test facility within DoD, testing a broad spectrum of military weapons systems and equipment including armored vehicles, guns, ammunition, trucks, bridges, generators, night vision devices, individual equipment (boots, uniforms, helmets, etc), and surface and underwater marine systems. As a multi-purpose proving ground, with a temperate climate, our primary mission is to plan, conduct, analyze and report on projects supporting research, development, test and evaluation (RDT&E), design, engineering, production, and surveillance tests for DoD and other government agencies, contractors, foreign governments, and private industry. In this single location, ATC can subject an item to a full range of tests from automotive endurance and full weapons performance with environmental extremes, to full-scale live fire vulnerability/survivability/lethality testing utilizing an extensive array of test ranges/facilities, simulators and models. In addition to testing domestic systems, we exploit foreign systems to assess the enemy threat. We also develop state-of-the-art test procedures (DoD, international), methodologies and instrumentation in order to meet the test requirements of advancing military technologies.

**CURRENT IMPORTANT PROGRAMS**

Armored Gun System  
Tank Gun Mount Trunnion Bearing Test  
M1A2 Abrams Upgrade Tank  
Halon Substitutes for Automatic Fire Extinguishing Systems  
M829A2 Cartridge, 120MM  
Family of Medium Tactical Vehicles (FMTV)

**EQUIPMENT/FACILITIES**

World-renowned automotive test/obstacle courses; numerous interior and exterior firing ranges; environmental simulation capabilities including rough-handling and vibration, electromagnetic interference and environmental conditioning capabilities; full transportability test capability to include rail, roadability, MIL-STD 209 pull and tie-down, internal and external air transport; Underwater Explosion test ponds and Depleted Uranium Containment Fixture (Superbox) for live fire vulnerability and lethality testing; sophisticated non-destructive test facilities; robotics test facilities; pulse radiation facility; Firing Impulse Simulator; state-of-the-art industrial complex which includes maintenance and experimental fabrication capabilities.

## Aberdeen Test Center

Aberdeen Proving Grd, MD 21005-5059  
(410) 278-3574

Commander: Colonel Richard O. Bailer  
Technical Dir.: James W. Fasig

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	1.497	0.762	2.259
6.3	2.247	1.141	3.388
<b>Subtotal (S&amp;T)</b>	<b>3.744</b>	<b>1.903</b>	<b>5.647</b>
6.4	0.000	0.000	0.000
6.5	8.613	4.376	12.989
6.6	29.369	19.898	49.267
6.7	1.686	0.856	2.542
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>43.412</b>	<b>27.033</b>	<b>70.445</b>
Procurement	17.089	9.936	27.025
Operations & Maintenance	3.206	1.470	4.676
Other	10.630	5.555	16.185
<b>TOTAL FUNDING</b>	<b>74.337</b>	<b>43.994</b>	<b>118.331</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

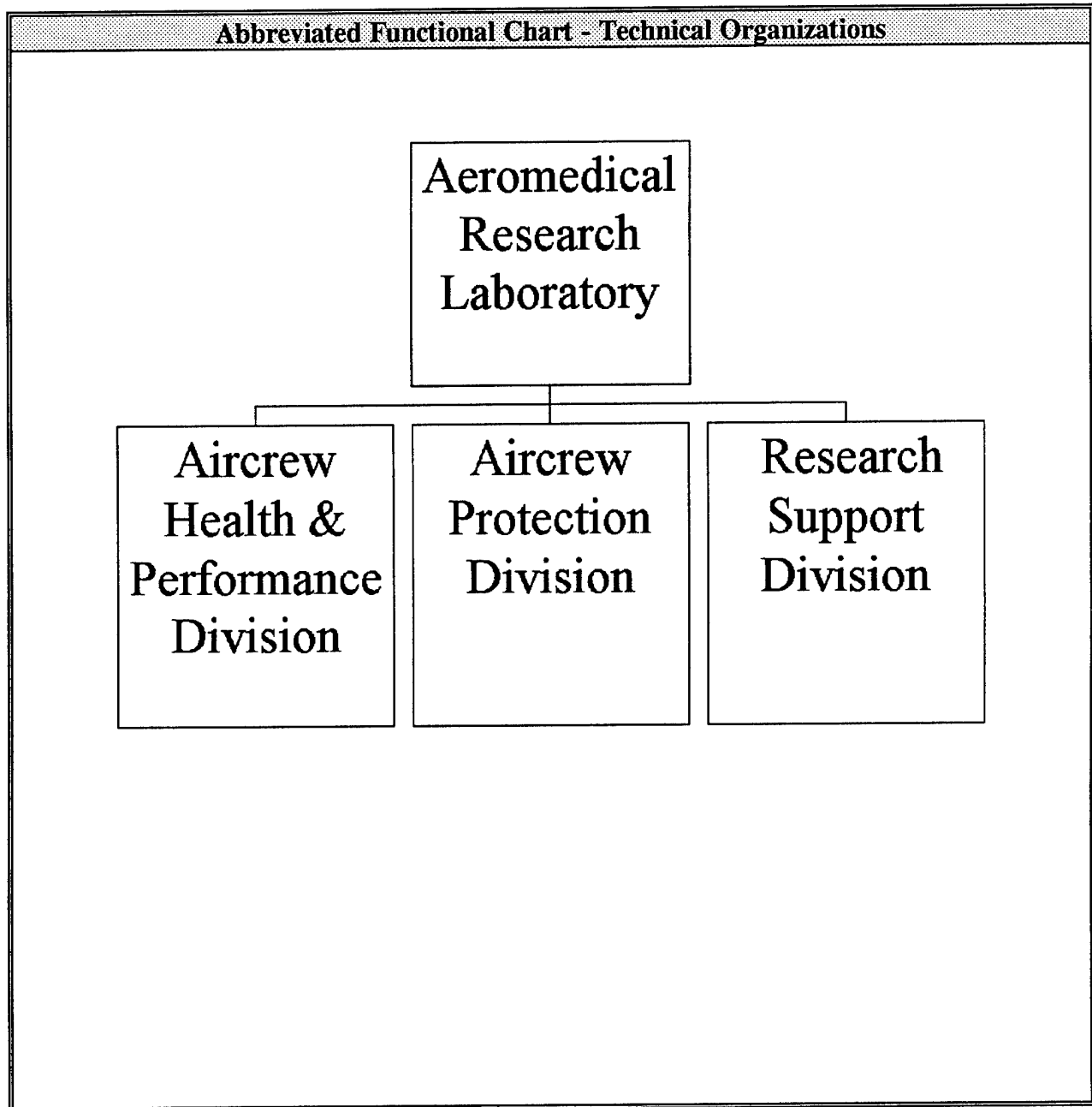
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	141	0	9	132
CIVILIAN	966	6	282	678
<b>TOTAL</b>	<b>1,107</b>	<b>6</b>	<b>291</b>	<b>810</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	120.290	<b>REAL PROPERTY</b>	56.070
ADMIN	147.541	* NEW CAPITAL EQUIPMENT	1.966
OTHER	936.247	<b>EQUIPMENT</b>	200.689
<b>TOTAL</b>	<b>1,204.078</b>	* NEW SCIENTIFIC & ENG. EQUIP.	10.285
<b>ACRES</b>	<b>56,707</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Aeromedical Research Laboratory**



**Aeromedical Research Laboratory**

Fort Rucker, AL 36362-0577

(334) 255-6920

Commander: COL Dennis F. Shanahan

Deputy Cdr: LTC Clyde D. Byrne

**MISSION**

Conduct medical research related to the effects of military aviation, combat vehicles, and other weapons systems on soldier health and performance. Conduct research on the impact of continuous operations on crew performance, and on the health hazards of emerging military materiel systems. Develop design criteria for aviator protective equipment and visual systems.

**CURRENT IMPORTANT PROGRAMS**

1. Aviator Performance Effects of Sustained Operations, Sleep Cycle Disruption and Extended Use of Night Vision Devices
2. Soldier Tolerance to Biomechanical Impact and Prevention of Impact Injury
3. Bifocal Contact Lenses for Use in Military Environments
4. Visual Performance with Flat Panel Displays

**EQUIPMENT/FACILITIES**

Multi-Axis Ride Simulation System; Helmet Drop Test Tower and Impact Facility; Variable Center of Gravity Helmet Device; Biochemistry Lab; UH-60 Aeromedical Research Flight Simulator; Helicopter Inflight Monitoring System; Modified Aircraft for Inflight Medical Research; Data Acquisition and Biotelemetry System - In-House/Mobile; Vivarium (to be closed in FY96); High Intensity Impulse Noise Generator (Shock Tube); Blast Overpressure Test Site (to be closed in FY96); Mobile Acoustics Lab; Anechoic and Reverberation Chambers; Bio-Optical Testing Lab; Optical Fabrication Lab; Electro-Optical Testing Lab; Mobile Visual Displays Lab; Scientific and Medical Research Information Center; MEDEVAC Equipment Testing Facility; and Aviation Epidemiology Data Register.



**Aeromedical Research Laboratory**  
Fort Rucker, AL 36362-0577  
(334) 255-6920

Commander: COL Dennis F. Shanahan  
Deputy Cdr: LTC Clyde D. Byrne

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.058	NA	0.058
6.1 Other	0.475	0.064	0.539
6.2 IED (Navy)	NA	NA	NA
6.2 Other	4.292	0.002	4.294
6.3	0.038	0.000	0.038
<b>Subtotal (S&amp;T)</b>	<b>4.863</b>	<b>0.066</b>	<b>4.929</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.025	0.000	0.025
<b>TOTAL RDT&amp;E</b>	<b>4.888</b>	<b>0.066</b>	<b>4.954</b>
Procurement	0.002	0.000	0.002
Operations & Maintenance	0.042	0.000	0.042
Other	3.244	0.000	3.244
<b>TOTAL FUNDING</b>	<b>8.176</b>	<b>0.066</b>	<b>8.242</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

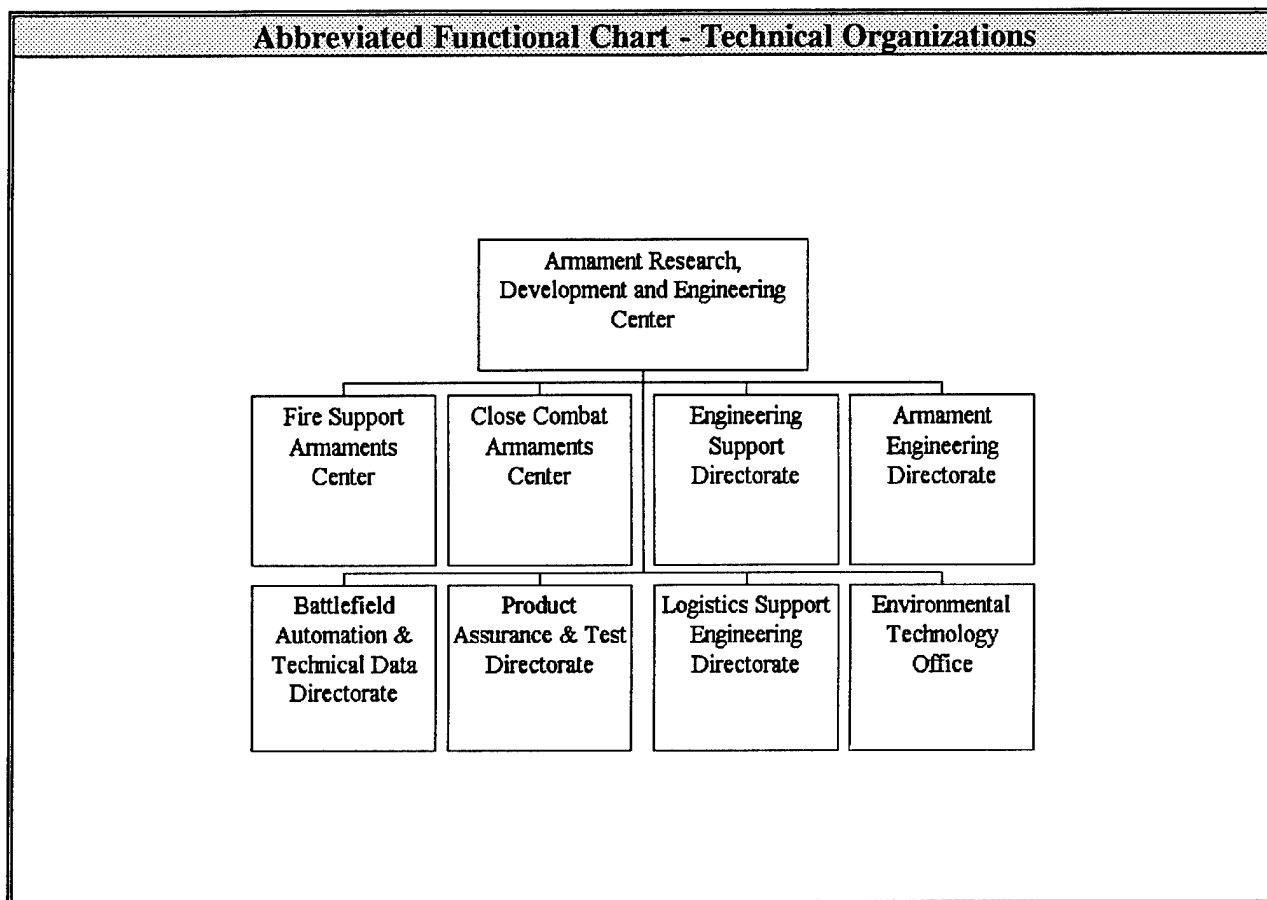
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	62	9	3	50
CIVILIAN	40	9	6	25
<b>TOTAL</b>	<b>102</b>	<b>18</b>	<b>9</b>	<b>75</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	96.000	<b>REAL PROPERTY</b>	12.246
ADMIN	17.500	* NEW CAPITAL EQUIPMENT	0.558
OTHER	27.660	<b>EQUIPMENT</b>	47.458
<b>TOTAL</b>	<b>141.160</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.482
<b>ACRES</b>	<b>44</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Armament Research, Development and Engineering Center**



**Armament Research, Development and Engineering Center**

Picatinny Arsenal, NJ 07806-5000  
(201) 724-6000

Commander: BG James W. Boddie, Jr.  
Technical Dir: Mr. Carmine Spinelli

**MISSION**

Conduct or manage research, development and life cycle engineering, including product assurance, engineering in support of items in production and integrated logistics support for assigned armament, munitions systems and materiel. Provide procurement and management of initial production quantities and technical support to soldiers and equipment in the field. Maintain a technology base to facilitate the design, development, procurement, production and life-cycle support of assigned materiel or transitioned technologies.

**CURRENT IMPORTANT PROGRAMS**

Less-than-Lethal Defeat (of personnel & vehicles) Mechanisms  
Smart Munitions (including Intelligent Mines & Low Cost "Competent" Munitions)  
Pollution Prevention for Defense Materiel Life Cycle Processes  
Tank, Cannon Artillery, Mortar Systems and all related Munitions  
Individual Soldier and Crew Served Weapons

**EQUIPMENT/FACILITIES**

Labs for the synthesis, characterization and analysis of explosives, propellants, and pyrotechnics. Capability to formulate, process, manufacture and test energetic materials in small scale production quantities for evaluation in end item configurations. Six degree-of-freedom simulator produces forces and stresses on material in an instrumented lab environment, while a 155mm air gun simulates spin and acceleration forces munitions experience during firing allowing for recovery and analysis of parts and components. The Arsenal's Electric Armaments Research Center features the world's highest energy capacitor-based electric gun laboratory power supply using a 52 megajoule capacitor storage to drive electric guns at energy levels exceeding current tank main armaments. Our Armaments Technology Facility (ATF) is the Army's premiere small and cannon-caliber facility for system design, validation and test of individual and crew-served small arms, air defense, aircraft, and combat vehicle armaments. The Distributed Interactive Simulation Node supports a full spectrum of high capacity simulation network activities for war fighting simulation for all mission commodities, such as the Paladin Self-Propelled Howitzer.

**Armament Research, Development and Engineering Center**

Picatinny Arsenal, NJ 07806-5000

Commander: BG James W. Boddie, Jr.

(201) 724-6000

Technical Dir: Mr. Carmine Spinelli

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	1.595	NA	1.595
6.1 Other	2.786	8.945	11.731
6.2 IED (Navy)	NA	NA	NA
6.2 Other	19.811	45.321	65.132
6.3	8.074	56.309	64.383
<b>Subtotal (S&amp;T)</b>	<b>32.266</b>	<b>110.575</b>	<b>142.841</b>
6.4	45.892	18.596	64.488
6.5	21.238	19.865	41.103
6.6	42.360	51.641	94.001
6.7	0.707	0.268	0.975
Non-DOD	0.528	0.205	0.733
<b>TOTAL RDT&amp;E</b>	<b>142.991</b>	<b>201.150</b>	<b>344.141</b>
Procurement	69.569	196.574	266.143
Operations & Maintenance	53.602	9.526	63.128
Other	11.562	18.535	30.097
<b>TOTAL FUNDING</b>	<b>277.724</b>	<b>425.785</b>	<b>703.509</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	9.500

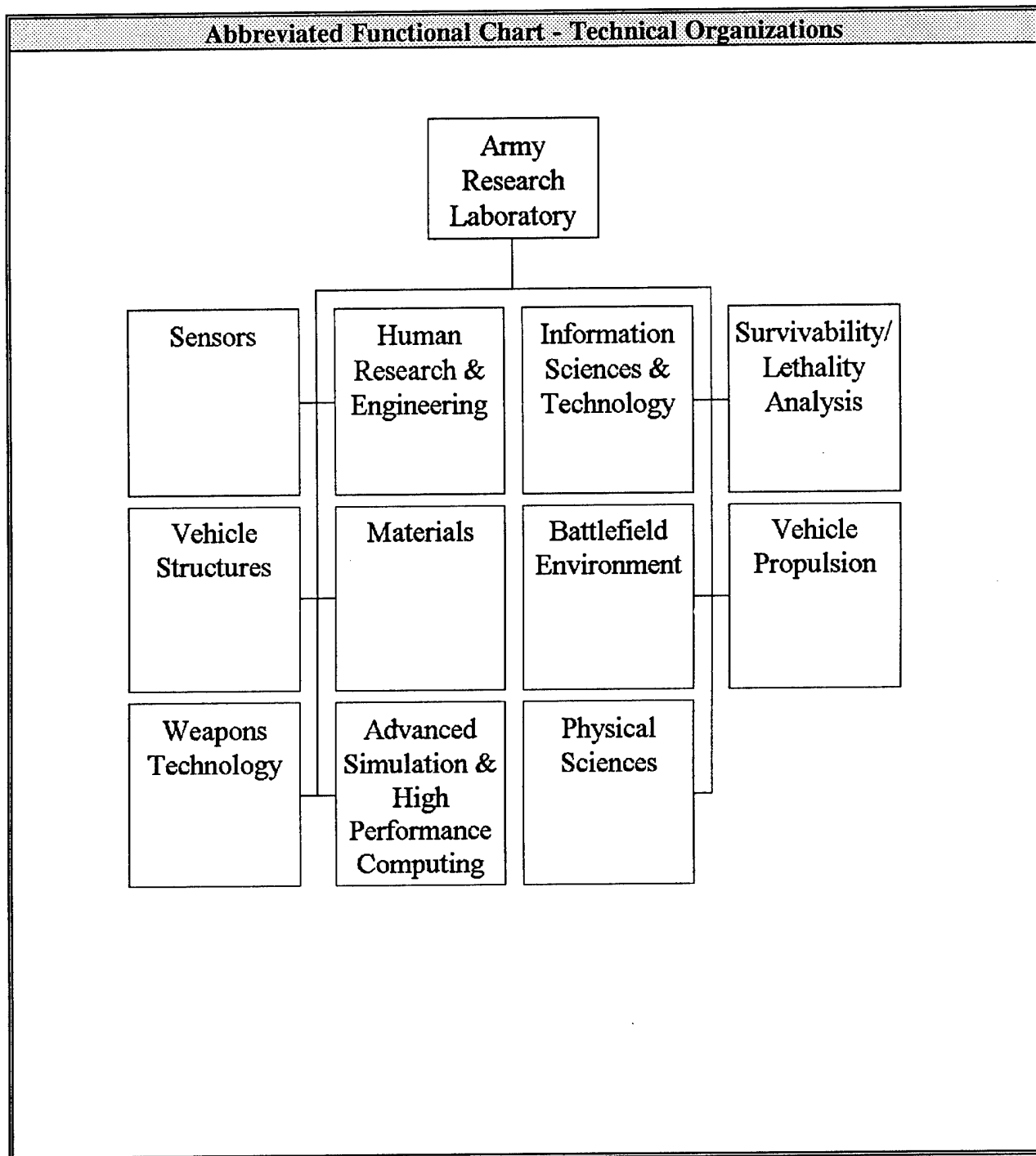
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	70	1	41	28
CIVILIAN	3,904	78	1,852	1,974
<b>TOTAL</b>	<b>3,974</b>	<b>79</b>	<b>1,893</b>	<b>2,002</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	308.822	<b>REAL PROPERTY</b>	180.513
ADMIN	1,137.989	* NEW CAPITAL EQUIPMENT	1.212
OTHER	2,619.000	<b>EQUIPMENT</b>	199.519
<b>TOTAL</b>	<b>4,065.811</b>	* NEW SCIENTIFIC & ENG. EQUIP.	1.212
ACRES	5,853	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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## Army Research Laboratory



**Army Research Laboratory**  
Adelphi, MD 20783-1197  
(301) 394-1600

Director: Dr. John W. Lyons  
Dep. Director: COL Thomas Dunn

### **MISSION**

The mission of ARL is to execute basic and applied research to provide the Army the key technologies and analytical support necessary to assure supremacy in future land warfare.

We envision the future ARL:

- A laboratory preeminent in key areas of science and engineering relevant to land warfare.
- A staff widely recognized as outstanding.
- A partner with the Defense community, close to Army users and seen by them as essential to their missions.
- An intellectual crossroads for the technical community, intensively interacting with academe, industry, and other government laboratories in the U.S. and abroad.

### **CURRENT IMPORTANT PROGRAMS**

- Digitization and Communications Science
- Armor and Armaments
- Soldier System
- Survivability/Lethality Analysis
- Air and Ground Vehicle Technology
- Technology Transfer:
  - 39 New Cooperative R&D Agreements (CRDAs)
  - 6 New Patent License Agreements (PLAs)
  - Developed Tech Transfer Office Home Page
  - Automatically Posting WEB Pages With ARL Tech Transfer
  - Opportunities, Patents, CRDAs and PLAs
  - Developed New Patent Marketing Strategy



**EQUIPMENT/FACILITIES****ARL Unique Facilities/Equipment**

Ultra Wideband Synthetic-Aperture Radar Testbed, Millimeter-Wave Instrumentation Test Facility, Acousto-Fluidic Test Facility, RF/Microwave Test Station, High-Power Microwave Research Facility, HIFX Flash X-Ray Facility, Triaxis Vibrator, Scale Model Test Facility, Icing Research Tunnel, Crashworthiness Facility, Transonic Dynamics Tunnel, Mechanics of Materials Laboratory, Nondestructive Evaluation Sciences Laboratory, Nanoelectronic Fabrication Facility, Ultralithograph Center, Advanced Microanalysis Center, Frequency Control and Acoustic Signal Processing Facility, Display Technology Center, Pulse Power Center, Flame Research Facility, Aerodynamics Range, Tungsten Alloy Range, Large-Caliber Experimental Test Facility, Cannon-Caliber Electromagnetic Launch Range, Explosive Mechanics Facility, Blast Range, Aircraft Vulnerability/Lethality Experimentation Facility, Obscurant Munitions Threat Simulation Facility, Screening Threat Simulation Facility, Out-of-Laboratory Facility, Computerized Mobility/Portability Course, Computerized 600-m Small Arms Range, Indoor/Outdoor Robotics and Automation Research Facility, High-Performance Computing Resources, Composites Processing Research Facilities, Materials Characterization Facility, Ion Implantation Facility, Special Meteorological Equipment, Atmospheric Profiler Research Facility, Laser/Aerosol Diagnostic Laboratory, Mobile Acoustic Source, Mobile Atmospheric Spectrometer, Electromagnetic Analysis Facility, Electro-Optical Countermeasures Missile Flight Simulation Facility, Electro-Optical Data Acquisition System, Acoustic/Seismic Countermeasures Vehicle, Field Mobile Measurement System, and Air Defense Electronic Warfare Facility.

Army Research Laboratory  
Adelphi, MD 20783-1197  
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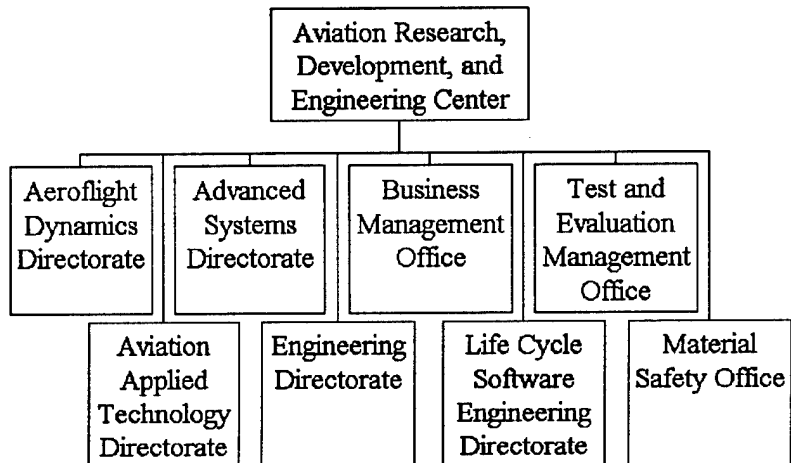
FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	53.339	20.536	73.875
6.2 IED (Navy)	NA	NA	NA
6.2 Other	106.507	63.793	170.300
6.3	2.012	19.460	21.472
<b>Subtotal (S&amp;T)</b>	<b>161.858</b>	<b>103.789</b>	<b>265.647</b>
6.4	0.224	0.000	0.224
6.5	0.000	0.000	0.000
6.6	76.922	53.378	130.300
6.7	1.114	0.244	1.358
Non-DOD	1.212	0.431	1.643
<b>TOTAL RDT&amp;E</b>	<b>241.330</b>	<b>157.842</b>	<b>399.172</b>
Procurement	0.121	0.104	0.225
Operations & Maintenance	0.221	1.449	1.670
Other	10.425	49.309	59.734
<b>TOTAL FUNDING</b>	<b>252.097</b>	<b>208.704</b>	<b>460.801</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	85	10	29	46
CIVILIAN	2,772	349	1,186	1,237
<b>TOTAL</b>	<b>2,857</b>	<b>359</b>	<b>1,215</b>	<b>1,283</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	1,482.359	<b>REAL PROPERTY</b>	586.000
ADMIN	586.926	* NEW CAPITAL EQUIPMENT	3.727
OTHER	118.846	<b>EQUIPMENT</b>	435.200
<b>TOTAL</b>	<b>2,188.131</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>1,759</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

**Aviation Research, Development and Engineering Center****Abbreviated Functional Chart - Technical Organizations**

**Aviation Research, Development and Engineering Center**

St. Louis, MO 63120-1798  
(314) 263-1012

Commander: MG John J. Cusick  
Technical Dir: Thomas L. House

**MISSION**

Execute the DoD Rotorcraft Science and Technology program and provide "one-stop" engineering support to all life cycle phases as required to achieve technologically superior, safe, and supportable Army aviation systems and equipment. The AVRDEC has the responsibility to plan and, in most cases, execute the fundamental basic research, exploratory development, and advanced development programs supporting DoD rotorcraft needs in the areas of aeromechanics, propulsion, structures, reliability and maintainability, survivability, weaponization, avionics mission equipment, and systems integration/simulation.

**CURRENT IMPORTANT PROGRAMS**

Rotorcraft Pilot's Associate; Joint Turbine Advanced Gas Generator and Integrated High Performance Turbine Engine Technology; Man/Machine Integration Design and Analysis System; Advanced Boresight Equipment; Advanced Aerial Internal and External Cargo Handling System; Unit Maintenance Aerial Recovery Kit; Autonomous Scout Rotorcraft Testbed; Aircraft Component Improvement Program.

Current CRADAs include:

Cockpit Systems for Short Haul Civil Tiltrotor - Boeing Defense and Space Group.

AH-64D Longbow Apache Prototype Aircraft - McDonnell Douglas Helicopter.

Material Characteristics of Composite Rotor Blades - Advanced Technologies, Inc.

Radar Detection Analysis Program - Sikorsky Aircraft.

Rotorcraft AFCS Aeroelastic Stability Analysis - Georgia Technology Research Corporation.

**EQUIPMENT/FACILITIES**

Crew Station Research and Development Facility: three blue/red team stations; fiberoptic helmet; one or two-seat cockpit; technical center can simulate 11 other aircraft, 99 threats, 20 moving targets and C3.

Flying Laboratory for Integrated T&E (FLITE): modified AH-1S aircraft; Apache PNVIS; reconfigurable voice I/O system; flight symbology; fully integrated instrumentation.

NASA-Ames Vertical Motion Simulator: four interchangeable cabins with virtual TV display; six DOF motion, acceleration, and velocities; sound generation system; pilot and co-pilot positions.

NASA-Ames Helicopter Human Factors Research Facility: four part-task simulators to investigate geographic orientation, visual cues simulator, voice actuated controls, and pilot decision-making.

NASA-Langley 14x22 Wind Tunnel: VSTOL/200 knots/variable test section; flow visualization and diagnostics; acoustics capability.

Infra-Red Suppressor Facility: IR suppression fabrication shop; engine and test stand with indoor and outdoor test ranges; Sun workstation and software for test data recording and analysis, and design and simulation of IR suppressors.

Ballistic Test Range: two outdoor and one indoor test range; fully instrumented for data collection and analysis; full-scale aircraft and component testing; fuel recovery system; API and HEI up to 30mm in caliber.

NASA-Ames 40x80x120 Wind Tunnel; NASA-Ames 7x10 Wind Tunnel; NASA-Ames Automation Sciences Research Facility; NASA-Ames Numerical Aerodynamic Simulator; NASA-Ames Fluid Mechanics Laboratory; NASA-Ames Hover Anechoic Chamber.

Aviation Research, Development and Engineering Center  
 St. Louis, MO 63120-1798  
 (314) 263-1012

Commander: MG John J. Cusick  
 Technical Dir: Thomas L. House

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	1.036	NA	1.036
6.1 Other	1.472	0.631	2.103
6.2 IED (Navy)	NA	NA	NA
6.2 Other	22.231	26.296	48.527
6.3	2.901	36.827	39.728
Subtotal (S&T)	27.640	63.754	91.394
6.4	1.388	5.102	6.490
6.5	0.000	0.000	0.000
6.6	7.948	8.601	16.549
6.7	0.077	2.955	3.032
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	37.053	80.412	117.465
Procurement	0.100	0.400	0.500
Operations & Maintenance	14.874	8.996	23.870
Other	5.665	5.778	11.443
TOTAL FUNDING	57.692	95.586	153.278

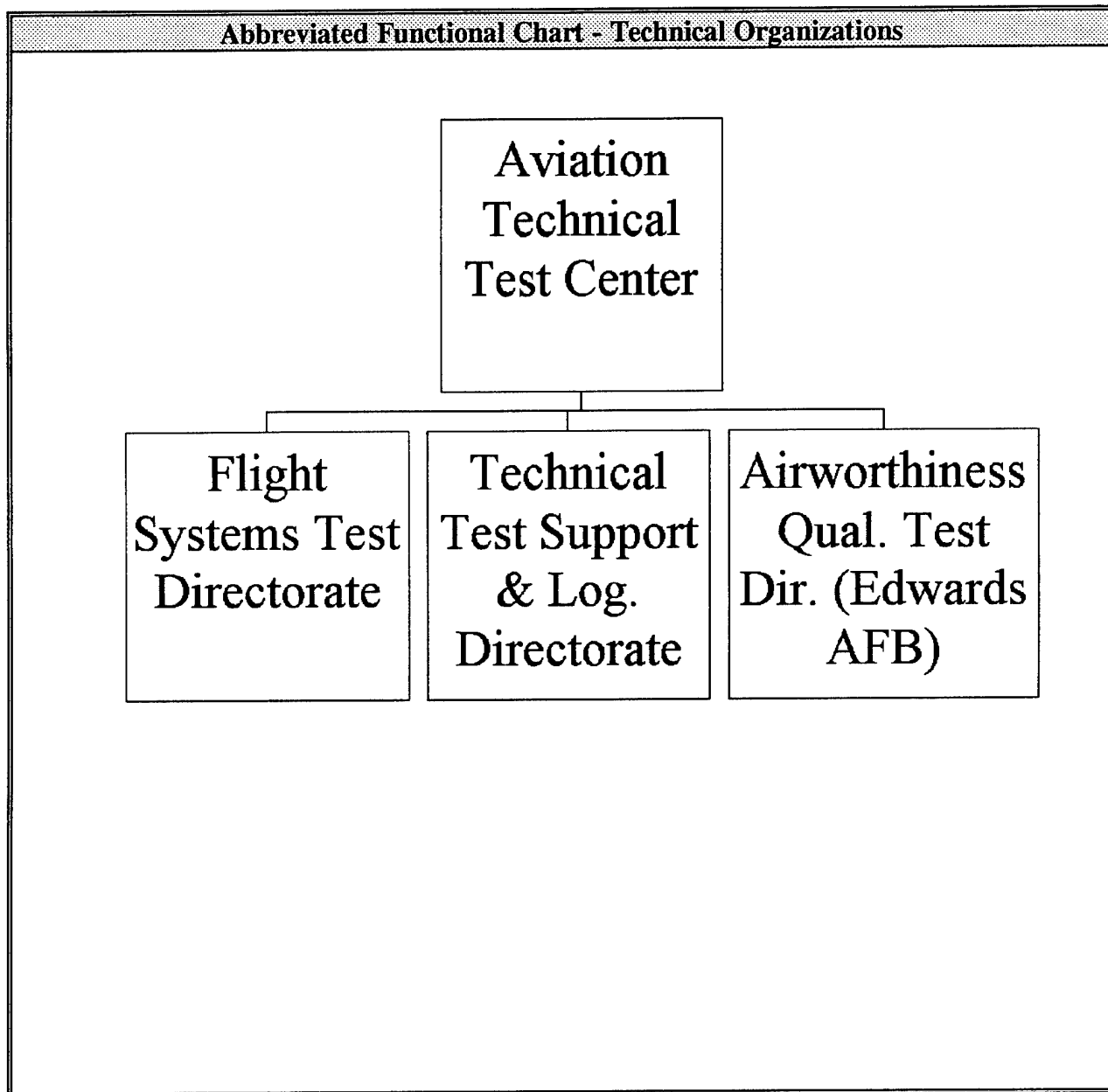
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	15	2	11	2
CIVILIAN	748	26	427	295
TOTAL	763	28	438	297

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	108.852	REAL PROPERTY	6.652
ADMIN	64.741	* NEW CAPITAL EQUIPMENT	0.050
OTHER	14.730	EQUIPMENT	27.758
TOTAL	188.323	* NEW SCIENTIFIC & ENG. EQUIP.	1.399
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Aviation Technical Test Center



**Aviation Technical Test Center**  
Fort Rucker, AL 36362-5276  
(334) 255-8000

Commander: COL Jack O. Shafer, Jr.  
Tech Dir: Flucher J. McCrory, Jr.

### MISSION

Plan, conduct, analyze, and report the results of developmental tests and studies to include airworthiness flight testing of Army aviation systems and associated materiel/systems. Provide test, test support, development support, and evaluations of aviation materiel/ systems; and provide other aviation support for authorized customers as directed by the U.S. Army Test and Evaluation Command.

### CURRENT IMPORTANT PROGRAMS

AH-64D Long Bow  
RAH-66 Comanche Program  
Special Operations Aircraft Program  
OH-58D Kiowa Warrior  
Universal Drone System Program

### EQUIPMENT/FACILITIES

Thirty nine rotary- and fixed-wing aircraft are currently assigned (2 AH-1F, 5 AH-64, 2 C-23A, 3 CH-3E, 2 CH-47D, 1 EH-60, 3 OH-58C/D, 2 OH-58DI, 3 T-34C, 2 U-21A/H, 8 UH-1H, 6 UH-60A/L) as test beds. Helicopter Icing Spray System (HISS): A CH-47D with an integrated 1,800-gallon water tank and spray apparatus combined with a highly instrumented U-21A to provide cloud physics documentation, conducts in-flight icing evaluations under both artificial and natural conditions. Full flight test instrumentation capability exist. Analog and digital aircraft data can be recorded and/or telemetered to the ground. On-site data processing and display exist (real time and postmission). Capability to collect and process video, still, and high-speed pictures exists.



Aviation Technical Test Center  
Fort Rucker, AL 36362-5276  
(334) 255-8000

Commander: COL Jack O. Shafer, Jr.  
Tech Dir: Flucher J. McCrory, Jr.

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
<b>Subtotal (S&amp;T)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	14.152	0.000	14.152
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>14.152</b>	<b>0.000</b>	<b>14.152</b>
Procurement	0.839	0.000	0.839
Operations & Maintenance	0.000	0.000	0.000
Other	3.260	0.000	3.260
<b>TOTAL FUNDING</b>	<b>18.251</b>	<b>0.000</b>	<b>18.251</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

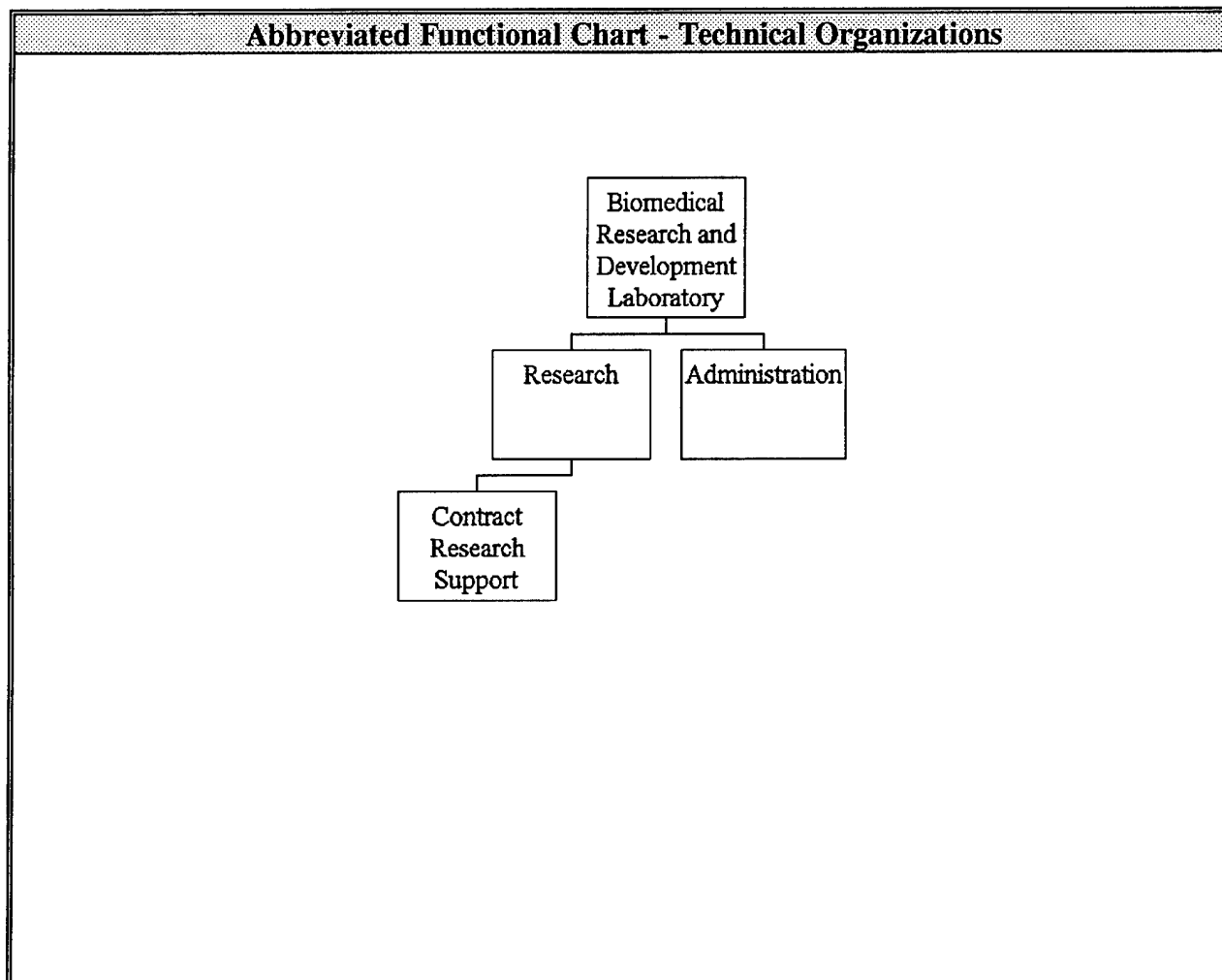
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	88	0	45	43
CIVILIAN	133	0	40	93
<b>TOTAL</b>	<b>221</b>	<b>0</b>	<b>85</b>	<b>136</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	0.000	<b>REAL PROPERTY</b>	3.600
ADMIN	94.125	* NEW CAPITAL EQUIPMENT	0.000
OTHER	233.000	<b>EQUIPMENT</b>	153.539
<b>TOTAL</b>	<b>327.125</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.572
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Biomedical Research and Development Laboratory**



**Biomedical Research and Development Laboratory**  
Fort Detrick, MD 21702-5010  
(301) 619-7685

Director: Mr. Henry S. Gardner, Jr.  
Assoc. Director: Dr. Robert A. Finch

#### **MISSION**

Conduct basic and applied research in the areas of environmental sentinel and alternative toxicity assessment model development and the development of new analytical methodologies. USABRDL identifies, develops, and validates health hazard and risk assessment methodologies for incorporation into an integrated environmental assessment approach for the evaluation of ecological and human hazards posed by complex chemical contamination of the environment. USABRDL provides research, development, and consultation services in the areas of hazard and risk assessment to the Army and other Federal and non-Federal activities.

#### **CURRENT IMPORTANT PROGRAMS**

Cross-species extrapolation of non-mammalian bioassay systems.

Development of sentinel toxicity biomonitoring systems.

Integrated environmental assessment of chemically contaminated sites at Army installations.

Identification, development, validation, and application of non-mammalian models for the assessment of toxic hazards.

Investigation of the underlying mechanisms of action of environmental toxicants on the non-mammalian model systems under development.

Exploration of the phylogenetically-conserved aspects of toxicity.

**EQUIPMENT/FACILITIES**

**AQUACULTURE AND AQUATIC TOXICOLOGY LABS:** Well water processing equipment, fish culture rooms, exposure rooms, enclosed total exhaust toxicant diluter devices, specialized air-handling equipment to prevent contamination with toxic chemicals, total-exhaust biological safety cabinets for containment of toxic chemicals, small environmental chambers for the performance of FETAX assay under controlled temperature conditions, image-analysis systems for frog larvae length measurements and histological tissue section analysis.

**IMMUNOTOXICOLOGY LAB:** Forma scientific water-jacketed incubators, Ceres UV900 Hdi microtiter plate readers, Leitz Laborlux microscopes, Leitz Labovert stage microscope, El 403H microplate autowasher, Thermolyne 37900 tabletop culture incubator, Labline titer plate shakers.

**ANALYTICAL CHEMISTRY LABS:** Quadrupole Mass Spectrometer with Particle Beam HPLC interface, Gas Chromatograph, High Performance Liquid Chromatograph with autosampler and data system; gas chromatographs with autosamplers, data systems, state-of-the-art sampling systems and multiple detectors to include mass selective and infrared detectors; high performance liquid chromatograph (HPLC) with automated sample preparation system (prepstation), diode array, ultraviolet, fluorescence detectors and data system; and Inductively Coupled Argon Simultaneous Emission Spectrometer (ICP) and ICP/Mass Spectrometer (ICP/MS) with Data Systems, Ultrasonic nebulizer and microwave sample introduction and preparation systems.

**MOBILE TRAILERS:**

**ANALYTICAL CHEMISTRY TRAILERS (2):** 48'x 8' mobile analytical chemistry laboratory with A/C, 100 KW diesel generator, and the following equipment: quadrupole mass spectrometer with particle beam HPLC interface, gas chromatograph with purge-and-trap sampling and data system; high performance liquid chromatograph with diode array, ultraviolet, fluorescence detectors, autosampler and data system; ICP with data system and ultrasonic nebulizer and microwave sample introduction and preparation systems; and gas chromatograph with flame ionization and electron capture detectors and data system.

**BIOLOGY TRAILERS (2):** Dilution water processing system; 2-3 toxicant diluter devices; automatic generator backup power; and continuous flow toxicity monitoring capabilities.

**SUPPORT MOBILE TRAILERS (2):** 48'x 8' mobile support laboratory with A/C, 50 KW diesel generator, local area network data system and communications equipment.

**FORT COLLINS FACILITIES:** Lab and office facilities at Colorado State University in conjunction with CRADA for image-analysis equipment.

**Biomedical Research and Development Laboratory**  
 Fort Detrick, MD 21702-5010  
 (301) 619-7685

Director: Mr. Henry S. Gardner, Jr.  
 Assoc. Director: Dr. Robert A. Finch

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.556	0.717	1.273
6.2 IED (Navy)	NA	NA	NA
6.2 Other	3.596	1.044	4.640
6.3	0.000	0.226	0.226
Subtotal (S&T)	4.152	1.987	6.139
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>4.152</b>	<b>1.987</b>	<b>6.139</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.701	0.701
<b>TOTAL FUNDING</b>	<b>4.152</b>	<b>2.688</b>	<b>6.840</b>

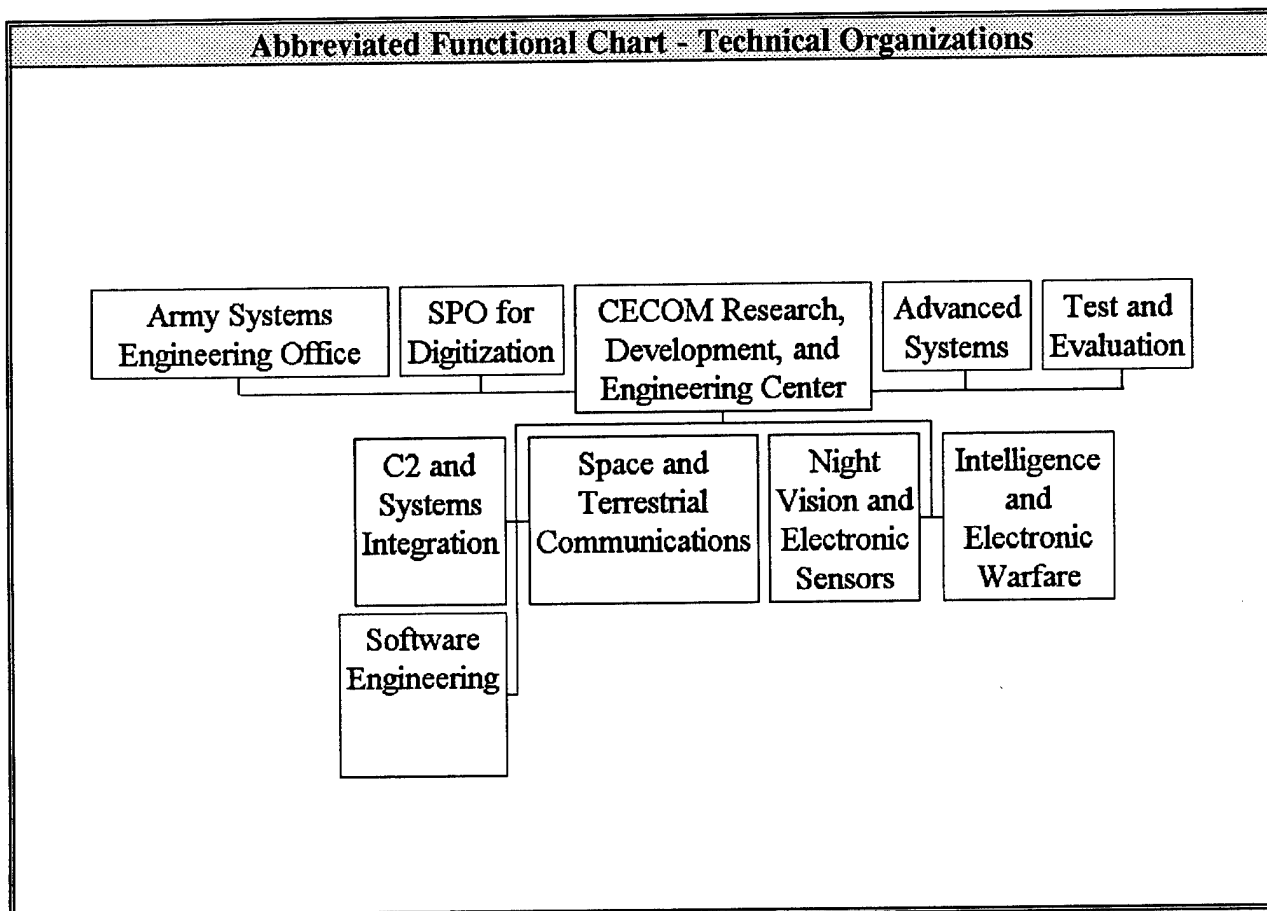
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	0	0	0	0
CIVILIAN	12	1	4	7
<b>TOTAL</b>	<b>12</b>	<b>1</b>	<b>4</b>	<b>7</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	7.888	REAL PROPERTY	0.000
ADMIN	5.304	* NEW CAPITAL EQUIPMENT	0.000
OTHER	5.552	EQUIPMENT	5.039
<b>TOTAL</b>	<b>18.744</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.746
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

**CECOM Research, Development & Engineering Center**



**CECOM Research, Development & Engineering Center**

Ft. Monmouth, NJ 07703-5209

(908) 532-0829

Director: Mr. Robert F. Giordano

Bus. Anal. Office: Constance Carnevale

**MISSION**

The Communications-Electronics Command Research, Development and Engineering Center (CECOM RDEC), headquartered at Ft. Monmouth, NJ, is the AMC Center for research, development and engineering in Command and Control, Communications, Computers and Intelligence (C4I); Electronic Warfare; Night Vision and Electro-Optics; Countermine; and Avionics. In supporting the Army Modernization Objectives, CECOM RDEC focuses on the following technology thrust areas:

- \*Digitizing the Battlefield
- \*Owning the Night
- \*Owning the Spectrum
- \*Knowing the Enemy
- \*Logistics Technology
- \*Software as a Force Multiplier
- \*Enhanced Survivability

The CECOM RDEC's mission is focused on providing support to the PEO's and PM's; managing technology base programs by defining, developing and acquiring superior technologies; developing, acquiring, testing and evaluating non-major systems; and sustaining and enhancing systems and equipment for a trained and ready Army.

CECOM RDEC works closely with PEOs, PMs, and the user community to exploit and acquire superior technologies while engineering ways to win the information war on the digital battlefield. Capabilities or force multipliers developed by the RDEC will provide battlefield commanders a common picture of the battlefield and allow them to see, hear, and engage the enemy day or night in all weather conditions; to deny hostile intentions through jamming; and to communicate and out-think the enemy using robust command and control systems and assured communications. CECOM RDEC is working closely with industry to explore potential commercial application of many other newly developed technologies, such as uncooled thermal imaging, fiber optics, local area networks, voice imaging, eye-safe lasers and speech processing.

The CECOM RDEC will promote and nurture a proactive atmosphere which embraces continuous improvement by being an organization committed to development of its workforce and attainment of individual fulfillment and team effectiveness.



**CURRENT IMPORTANT PROGRAMS**

1. CECOM RDEC is providing its technology to the Advanced Warfighting Experiments (AWEs) in support of Task Force XXI efforts. The Combined Arms Command and Control(CAC2) ATD participated in Focused Dispatch AWE which was completed in Sep 95. CAC2 radio simulation models linked battle simulators with remote live units and allowed realistic communications for the first time in a virtual environment. RDEC also installed Frequency Hopping Multiplexers into vehicles in support of Focused Dispatch. The Survivable Adaptive System (SAS) ATD participated in the Prairier Warrior AWE, demonstrating the ability to provide the Commander and staff with an improved common picture of the battlefield. RDEC developed system architecture for Command and Control for Warrior Focus AWE; and the Commercial Communications Tech Lab (C2TL) introduced land mobile radio selected for insertion into Warrior Focus in support of Dismounted Soldier operations. RDEC will continue to play an important role in the AWEs leading to Task Force XXI.
2. CECOM RDEC managed 54% of the Army's Advanced Technology Demo (ATD) program in FY-95. During the year, we successfully completed 5 of our ATDs: Survivable Adaptive System (SAS) ATD, Radar Deception and Jamming(RD&J) ATD, Close-In Manportable Mine Detector (CIMMD) ATD, Multi-Sensor Aided Targeting Air (MSAT) ATD, and Common Ground Station (CGS) ATD. The SAS ATD successfully provided a survivable communications network with increased capacity and flexibility to support multimedia (data, voice, imagery) information distribution on the digital battlefield. The RD&J ATD successfully developed and demonstrated an Integrated EW system that yields a significant increase in Airborne Survivability while working in conjunction with other on-board avionics. The CIMMD ATD successfully evaluated Infrared and Ground Penetrating Radar Detection Systems independently and in combination, and transitioned technology to Hand-Held Stand-off Mine Detection Sensor Program. The MSAT-Air ATD demonstrated the economical fusion of multiple sensor/processor modules in an automated target acquisition suite for application to next generation and future aviation assets. The CGS ATD provided an expanded automated and integrated capability to receive, process, correlate, display and disseminate intelligence and targeting data to the Brigade Commander. Transition is in process with PM Joint STARS and PM Intelligence Fusion.
3. The Army STARS demo project received the 1995 Federal Technology Leadership Award from Government Executive Magazine for its "shift from stove-pipe systems to an architecture-based product line approach for developing and maintaining software."
4. The CECOM RDEC countermine program is supporting the soldier in Bosnia. Several different systems have been provided, such as Vehicle Mine Protection Kits for HMMWVs and 5-ton vehicles; Prototype Remote Controlled Vehicular Mounted Mine Detection Sys; Magnetic Mine Countermeasures Sys; Prototype Surveillance and Image Transmission systems.

**CURRENT IMPORTANT PROGRAMS (continued)**

5. Technology Transition efforts. The CECOM RDEC is very active in pursuing CRDAs with industry and academia. A total of 33 were active in FY-95. The CRDAs include one for the development of architectures employing ATMs and one for the enhancement of data fusion technology for a variety of military and non-military applications. Some of the other CRDAs focus on developing software enabling tools for Battle Damage Assessment, enhancing electronic warfare technology by evaluating and testing components and subsystems such as advanced antennas, receivers and software processors; and the design of spread spectrum wire communications.

Small Business Innovation Research (SBIR). In harnessing the innovative talents of small technology companies, CERDEC once again has one of the largest programs among the 28 Army players. SBIR "seed money" totaling \$10.4M was placed on 73 Phase I and Phase II contracts designed to increase commercialization (Phase III) of SBIR research in military and private sector markets. Seven new CECOM SBIR projects transitioned into Phase III status utilizing external (non-SBIR) funding.

Technology Leveraging Through Strategic Partnerships. Under ARPA's Technology Reinvestment Project (TRP) Program, CECOM RDEC has formed a strategic alliance with premier New Jersey companies (AT&T, Sarnoff and Bellcore) to win selection of a \$2.5M multiyear program to develop a Wireless Interworking Testbed. This testbed will establish and sustain a national testbed for the demonstration of emerging communications for military and commercial applications.

Independent Research and Development (IR&D). CERDEC has recognized the DoD IR&D program as an excellent leveraging opportunity to maximize investments into CECOM's core technology base programs. Efforts include conducting focused Technology Interchange Meetings (TIMs) and articulating real needs to help industry focus their IR&D programs and provide the CECOM community with an insight into key IR&D projects with potential for profound military significance. CERDEC has a most lucrative TIM program, with eight meeting in FY95 representing 49 projects valued at \$21.9M. CERDEC also has developed a reference pamphlet which links IR&D projects identified in the DTIC IR&D CD ROM database with our individual work packages to assist in the integration of industrial and government efforts and the avoidance of duplication of efforts. This book which will be updated yearly, is disseminated to project engineers to help identify ongoing IR&D efforts which might support their projects.

Patent Licensing Agreement - Pocket-Sized Electrometer Type Dosimeter. This agreement has resulted in a successful commercialization effort, with the CERDEC receiving its first royalty and licensing fee payment (\$3,154) in June 95. CERDEC licensed the charger technology to S.E. International, Inc. based in Summertown, Tenn. S.E. International is using the CERDEC technology in its charger for this dosimeter. The dosimeter is used to measure levels of radiation exposure. The company sold over 100 charger units in 1995.

**EQUIPMENT/FACILITIES**

The RDEC boasts many U.S. Government-unique and world-unique facilities supporting a broad range of technical areas. These facilities will significantly enhance RDEC's ability to increase productivity for future R&D efforts in a timely and cost effective manner. The following is a representative sampling of the RDEC state-of-the-art equipment and facilities.

The Digital Integrated Lab/Testbed (DIL/T) is a dynamic world-class integrated facility that electronically links distributed RDEC labs, industry facilities, Battle Labs, field sites, and joint activities. The DIL/T can be rapidly reconfigured to replicate diverse existing and evolving tactical C3I/EW battlefield environments for systems engineering, development, integration, and evaluation of the digital battlefield. The Army Digitization Office has mandated that all equipment and technology to be used in the Digital Battlefield must be tested and/or run through the DIL/T.

The Commercial Communications Technology Laboratory (C2TL) was established to take advantage of commercial breakthroughs by assessing their utility for military applications with the main objective being to ensure timely, successful and cost effective insertion of commercial technology. The C2TL is a key component of the Digital Integrated Lab/Testbed. Industry is encouraged to use these facilities to demonstrate their evolving technologies, Independent Research and Development (IR&D) efforts, and communications products for military utility and applications.

CECOM RDEC has broken ground on a new facility totaling 105,685 sq ft of R&D area and a 16,000 sq ft limited access warehouse for the Intelligence and Electronic Warfare Directorate. The R&D facility will be built to limited access and sensitive compartmented information facility (SCIF) and will house the Automated Data Processing Lab, Electronic Countermeasure Lab, Signal Processing/Electronic Lab, Integration Lab/Common Ground Station, Anechoic Chamber, and the System Integration Lab.

Signals Analysis Lab - This laboratory is the only U.S. in-house source of the critical signal processing required for technology development of highly classified signals and for rapid analyses and responses to changing threats emerging from areas of high national interest. The Lab's central facility combines hardware and software capabilities for digital signal analysis and waveform measurement. Some of the equipment has unparalleled capability in either Government or private industry.

Tactical Support Facility - Unique, quick-reaction facility developed to provide real-time signal analysis in support of tactical units.

The construction of a 20,000 sq ft addition to an existing facility was completed for the integrated Defense Satellite Communication System (DSCS) Operations Center (DSCSOC). It is the focal point for DSCS network control evaluations and analyses.

**CECOM Research, Development & Engineering Center**  
 Ft. Monmouth, NJ 07703-5209  
 (908) 532-0829

Director: Mr. Robert F. Giordano  
 Bus Anal Office: Constance Carnevale

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	1.406	NA	1.406
6.1 Other	1.533	1.700	3.233
6.2 IED (Navy)	NA	NA	NA
6.2 Other	31.013	42.639	73.652
6.3	23.358	118.855	142.213
<b>Subtotal (S&amp;T)</b>	<b>57.310</b>	<b>163.194</b>	<b>220.504</b>
6.4	5.396	9.236	14.632
6.5	9.981	18.561	28.542
6.6	9.584	14.923	24.507
6.7	4.964	11.784	16.748
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>87.235</b>	<b>217.698</b>	<b>304.933</b>
Procurement	27.948	83.659	111.607
Operations & Maintenance	25.376	115.996	141.372
Other	3.592	27.309	30.901
<b>TOTAL FUNDING</b>	<b>144.151</b>	<b>444.662</b>	<b>588.813</b>

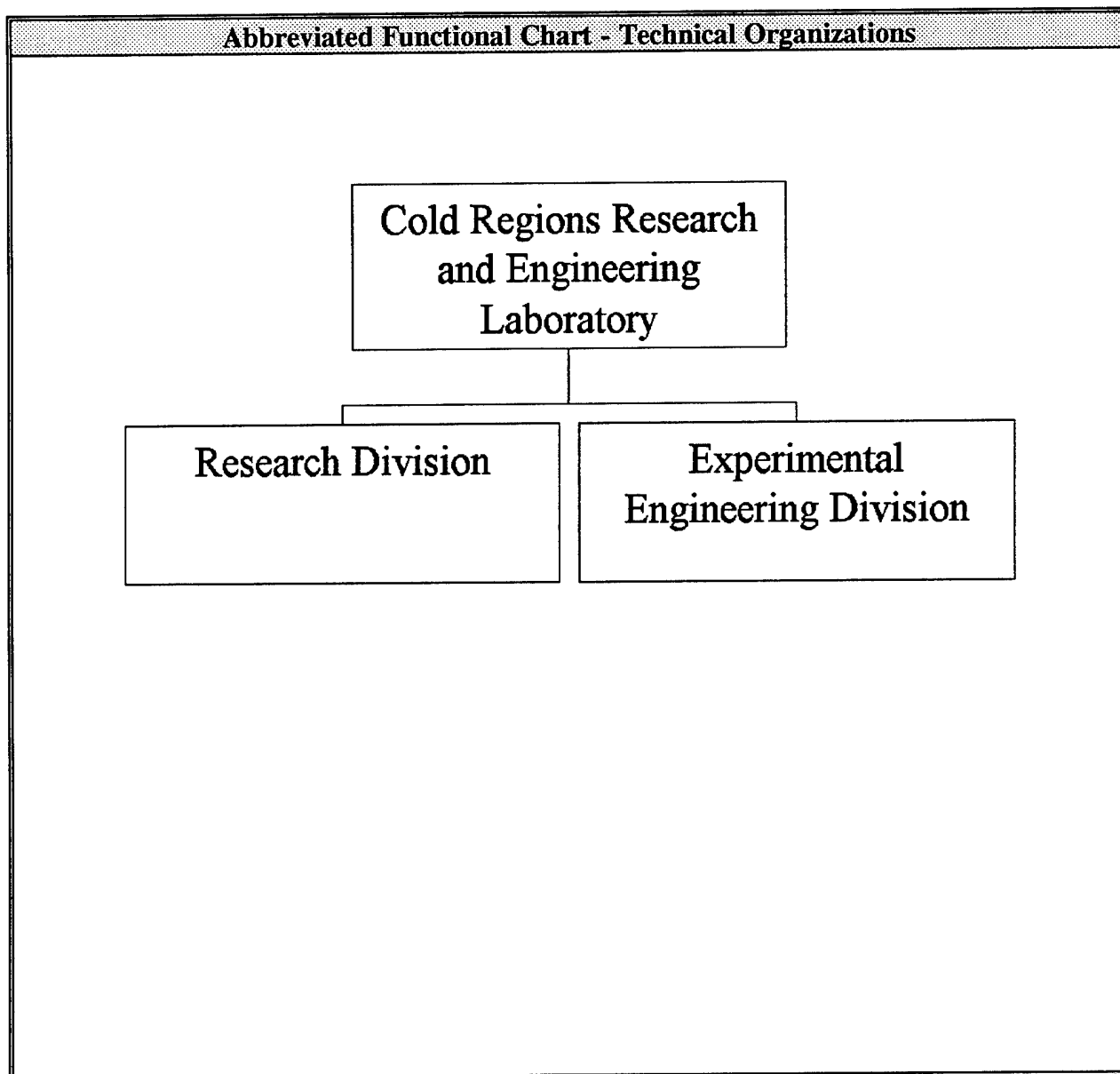
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	115	0	39	76
CIVILIAN	2,291	74	1,367	850
<b>TOTAL</b>	<b>2,406</b>	<b>74</b>	<b>1,406</b>	<b>926</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	421.400	<b>REAL PROPERTY</b>	65.600
ADMIN	361.900	* NEW CAPITAL EQUIPMENT	3.608
OTHER	16.900	<b>EQUIPMENT</b>	244.813
<b>TOTAL</b>	<b>800.200</b>	* NEW SCIENTIFIC & ENG. EQUIP.	1.713
<b>ACRES</b>	<b>2,299</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Cold Regions Research & Engineering Laboratory



**Cold Regions Research & Engineering Laboratory**  
Hanover, NH 03755-1290  
(603) 646-4200

Director: Dr. L. E. Link  
Commander: Lt. Col. M. Nelson

#### **MISSION**

Advancing knowledge of the cold regions through scientific and engineering research and putting that knowledge to work for the Army, DoD and the Nation is the mission of the U.S. Army Cold Regions Research and Engineering Laboratory (USACRREL). Operating in cold regions requires appropriate equipment, training and doctrine, often very different from those used in more temperate conditions. These special requirements cover a broad range of military activities and can incur significant cost or capability penalties. Special challenges of cold regions exist on the more than 30% of the earth's surface that is covered by ice or underlain with permafrost. In addition, persistent and severe winter conditions occur in 50% of the earth's surface including areas of Europe, Asia and North and South America. Bosnia/Herzegovina and North and South Korea are areas of interest today that experience severe winter conditions that could significantly impact military operations. USACRREL provides the technology to allow the Army to operate effectively in cold regions environments to maintain national security and foster peace.

USACRREL R&D focuses on all aspects of the cold/winter environment and its implications for military activities in garrison or on the battlefield. The singular exception being individual soldier clothing and equipment. CRREL also addresses the nations winter water resources issues through the civil works program of the Corps of Engineers. Having a single-focused cold regions R&D organization that is the primary source of special expertise for DoD, and both serves and leverages resources and efforts of other federal, state, and local agencies and the private sector, is an investment strategy that has resulted in an outstanding and cost effective capability for DoD and the Nation.

**CURRENT IMPORTANT PROGRAMS**

USACRREL's current military programs are concentrated in three major R&D areas: Military Engineering, Battlespace Environments, Civil Engineering, and Environmental Quality.

**Military Engineering** - Providing innovative solutions to the difficult engineering problems that the soldier faces in winter within the confines of existing and emerging equipment and manpower resources is the primary thrust of the CRREL military engineering research efforts. This work is accomplished in conjunction with the primary materiel developer or with troop units to assist in focusing the research and provide direct transition and feedback. Focus areas are winter combat engineering, mobility, and operability. This research serves the cold regions requirements of all the military services and is directly relevant to current Army activities in Korea and Bosnia.

The Battlespace Environments research supports the design, test and evaluation of new systems through characterization, modeling and simulation of the highly varied world environmental conditions and their impact on systems (fielded or notional) performance. Winter and cold regions conditions are particularly difficult constraints for systems development and operation. Examples of direct support include icing problems for aircraft, modeling and simulation of the background environment and its impact on smart weapons systems and mine/countermine systems, and the ability to project the environmental conditions in denied areas or into the future to assist in C4I. Research at CRREL serves the cold regions needs of all military services. Of particular significance is the support to the Navy for Arctic operations and to the Air Force and Army on the impact of winter conditions on ATR and smart weapons systems. Research on the low temperature performance of composites for the Army and Air Force supports the Advanced Materials pervasive function.

The Civil Engineering (CE) R&D generates technology for cost reductions in designing, building, operating, and maintaining military facilities in areas that experience harsh winter and severe cold weather, where infrastructure life-cycle costs and energy costs are high. USACRREL CE R&D efforts help solve critical DoD civil engineering problems related to training, mobilizing, deploying, sustaining, protecting, and employing U.S. Forces in cold environment at any time. Research in this area supports Tri-Service winter and cold regions issues.

The Environmental Quality R&D generally supports the test and evaluation of materiel systems through maintenance of training and test ranges, allowing their continued use while conserving the integrity of the environment. This is an especially difficult problem for ground vehicles and weapons systems that can have dramatic impacts on the flora and fauna of military ranges. The environmental quality area also has close ties to the Battlespace Environments area because of their common need for characterization and quantification of the geophysical processes that govern both the impact of the operating environment on military operations and systems, and the impact of activities on the quality of the natural environment. USACRREL research supports compliance, cleanup, and conservation goals focusing on special constraints imposed by winter conditions and cold climates. Research in this area supports Tri-Service cold unique environmental quality issues.

**EQUIPMENT/FACILITIES**

USACRREL has a complex of low temperature laboratories and experimental research facilities not found anywhere else in the world. The main laboratory consists of 24 low temperature research laboratories with a temperature range down to -35 degrees F. The 73,000 square foot Ice Engineering Facility houses three special-purpose research areas; a large low-temperature towing tank, a 100-foot long refrigerated flume for modeling rivers, and a large hydraulic-model room for studying ice impacts on civil works facilities, primarily locks and dams. The 29,000 square foot Frost Effects Research Facility (FERF) supports full-scale research on the impact of freeze-thaw cycles on pavements, foundations, and utility systems. The nationally unique FERF facility provides capability to simulate natural 3-D freeze-thaw cycles to study in-situ seasonal evaluation of combat equipment, development of effective doctrine and techniques, and support to DoD initiative on counter proliferation and treaty verification in cold environments. A DoD-unique 9000 square foot Low Temperature Materiel Test Facility provides additional capability focusing on winterization of military hardware systems. USACRREL's Low Temperature Materials Laboratory is a DoD-unique facility specially designed to investigate composite materials performance subject to low-temperature and thermal cycling for potential use for future Army Armor Vehicles. CRREL has access to two permafrost research sites in Alaska.

In addition, USACRREL houses the 16,400 square foot Corps Civil Works Remote Sensing/Geographic Information System Center, and a state-of-the-art DoD Cold Regions Technical Information Analysis Center (CRSTIAC). The 24,000 square foot CRSTIAC facility is home to the most comprehensive collection of cold regions science and engineering data in the world.



## Cold Regions Research &amp; Engineering Laboratory

Hanover, NH 03755-1290

(603) 646-4200

Director: Dr. L. E. Link

Commander: Lt. Col. M. Nelson

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.207	NA	0.207
6.1 Other	1.186	0.068	1.254
6.2 IED (Navy)	NA	NA	NA
6.2 Other	7.029	0.990	8.019
6.3	0.324	0.020	0.344
<b>Subtotal (S&amp;T)</b>	<b>8.746</b>	<b>1.078</b>	<b>9.824</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	5.137	1.956	7.093
6.7	2.039	3.966	6.005
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>15.922</b>	<b>7.000</b>	<b>22.922</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	7.360	1.413	8.773
Other	7.972	2.017	9.989
<b>TOTAL FUNDING</b>	<b>31.254</b>	<b>10.430</b>	<b>41.684</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

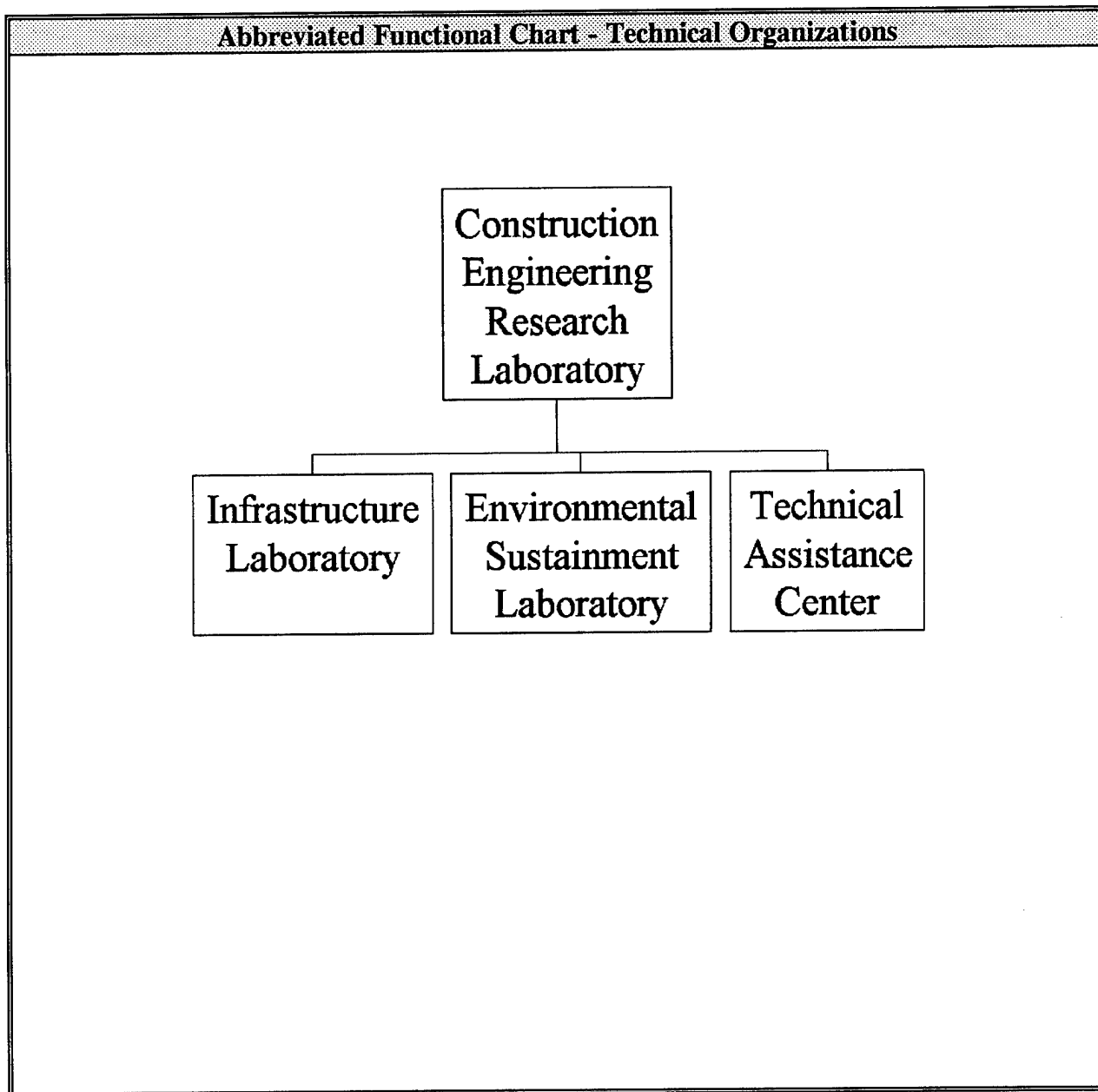
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	4	1	3	0
CIVILIAN	265	52	83	130
<b>TOTAL</b>	<b>269</b>	<b>53</b>	<b>86</b>	<b>130</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	242.177	<b>REAL PROPERTY</b>	34.401
ADMIN	2.400	* NEW CAPITAL EQUIPMENT	0.000
OTHER	66.438	<b>EQUIPMENT</b>	27.419
<b>TOTAL</b>	<b>311.015</b>	* NEW SCIENTIFIC & ENG. EQUIP.	1.240
<b>ACRES</b>	<b>207</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Construction Engineering Research Laboratories**



**Construction Engineering Research Laboratories**  
Champaign, IL 61826-9005  
(217) 373-7216

Cmdr/Acting Dir: COL James T. Scott  
Technical Dir: Dr. Michael J. O'Connor

#### **MISSION**

OCE General Orders 17, 9 Sep 68, established USACERL as a Separate Field Operating Agency (SFOA) under the Chief of Engineers. By OCE General Orders 16, 20 May 74, USACERL was placed under the staff supervision of the USACE Research and Development Directorate. ER 10-1-26 assigns USACERL the mission of performing infrastructure and environmental sustainment research, development, studies and technical assistance to maintain a quality trained and ready Army; to set the standard in preserving and protecting its land, water and natural and cultural resources; and to repair, maintain and rehabilitate civil works facilities. It performs research and development for enhancing engineer capability to deploy rapidly and to sustain a full range of military operations. It executes the mission through various functional elements.

#### **CURRENT IMPORTANT PROGRAMS**

Clean Energy Supply and Efficient Utilization Technologies  
Building Design and Rehabilitation for Seismic Loads  
Concurrent Engineering  
Training Land Carrying Capacity  
Pollution Controls for Military Manufacturing Processes  
Pentagon Renovation  
Project City  
Modular Design Systems (MDS)  
Business Processes  
Protocols for Military Training to Reduce Impact on Threatened and Endangered Species

**EQUIPMENT/FACILITIES**

**Triaxial Earthquake and Shock Simulator (TESS):** A unique dual-mode shock and vibration test facility. The TESS, in its biaxial mode, simulates a wide range of transient shock vibrations typical of military applications requiring large accelerations over a wide frequency range with moderately heavy test specimens. In the triaxial mode, it can simulate a variety of vibration environments including earthquakes and random vibrations, as well as log-sweep and resonant searches. The TESS is one of the premier seismic experimental test facilities in this country.

**Ion Plating Systems:** Custom-designed to meet highly specialized research specifications to do small scale prototype thin film coating experiments; only facility of this kind (plasma-assisted physical vapor disposition) in the Army.

**Heating, Ventilation and Air Conditioning Test Facility:** A large "mini-facility" with four rooms (zones) that can be thermally controlled separately to replicate a variety of HVAC systems and conditions, including dual or single duct and variable or constant air volume conditions; includes ventilation system, hot water supply loops, chilled water supply loops, HVAC systems configuration, facility controls, and data acquisition system; used to validate the energy thermodynamics analysis program and to analyze performance of proposed standard digital control panels; unique within DoD.

**Acoustics Lab:** Impulse Noise Technology Center; one of a kind in the world to quantify impact and mitigation of cannon, helicopter, blast and small caliber weapon fire on human endurance and the natural ecosystem; unique facility in DoD.

**Integrated Simulation Language Laboratory:** Twelve SUN SPARC stations and a Silicon Graphics Iris Crimson Virtual Reality engine, networked with the DoD simulation community via INTERNET to develop and test an advanced object-oriented, collaborative software development environment for producing the next generation of distributed, interactive simulations for DoD.

**Paint Laboratory:** Specialized equipment necessary to perform Qualified Product List testing on paints used by the Army (an "honest broker" function); capability to manufacture lab size batches of experimental coatings and perform both real-time and accelerated performance testing of coatings; capability to perform forensic analysis of paint samples.

**Spatial Planning & Management Center:** Facility to incorporate GIS into Master Planning R&D with state-of-the-art hardware and software for research at USACERL and partnering with the University of Illinois' Department of Urban and Regional Planning in the College of Fine and applied Arts.

**Equipment and facilities co-located at the University of Illinois, Urbana-Champaign:** In 1966, the U.S. Army Corps of Engineers proposed a new laboratory for engineering research to support military construction. In national competition in 1967, the University of Illinois at Urbana-Champaign was selected for co-location with USACERL. This unique relationship between USACERL and the University of Illinois, annually cited as one of the top three engineering schools in the nation, has been touted by HQ USACE as a prime example of "reinventing Government." Of approximately 900 personnel working at USACERL, over 450 are University of Illinois faculty, staff or students. Designated as an allied agency of the University of Illinois, \$250-500 million of University of Illinois research laboratory equipment is accessible.

**Construction Engineering Research Laboratories**  
 Champaign, IL 61826-9005  
 (217) 373-7216

Cmdr/Acting Dir: COL James T. Scott  
 Technical Dir: Dr. Michael J. O'Connor

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.062	NA	0.062
6.1 Other	1.811	5.578	7.389
6.2 IED (Navy)	NA	NA	NA
6.2 Other	12.526	10.299	22.825
6.3	4.735	6.927	11.662
<b>Subtotal (S&amp;T)</b>	<b>19.134</b>	<b>22.804</b>	<b>41.938</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	4.104	3.726	7.830
6.7	0.000	0.000	0.000
Non-DOD	2.164	3.432	5.596
<b>TOTAL RDT&amp;E</b>	<b>25.402</b>	<b>29.962</b>	<b>55.364</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	15.112	13.274	28.386
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>40.514</b>	<b>43.236</b>	<b>83.750</b>

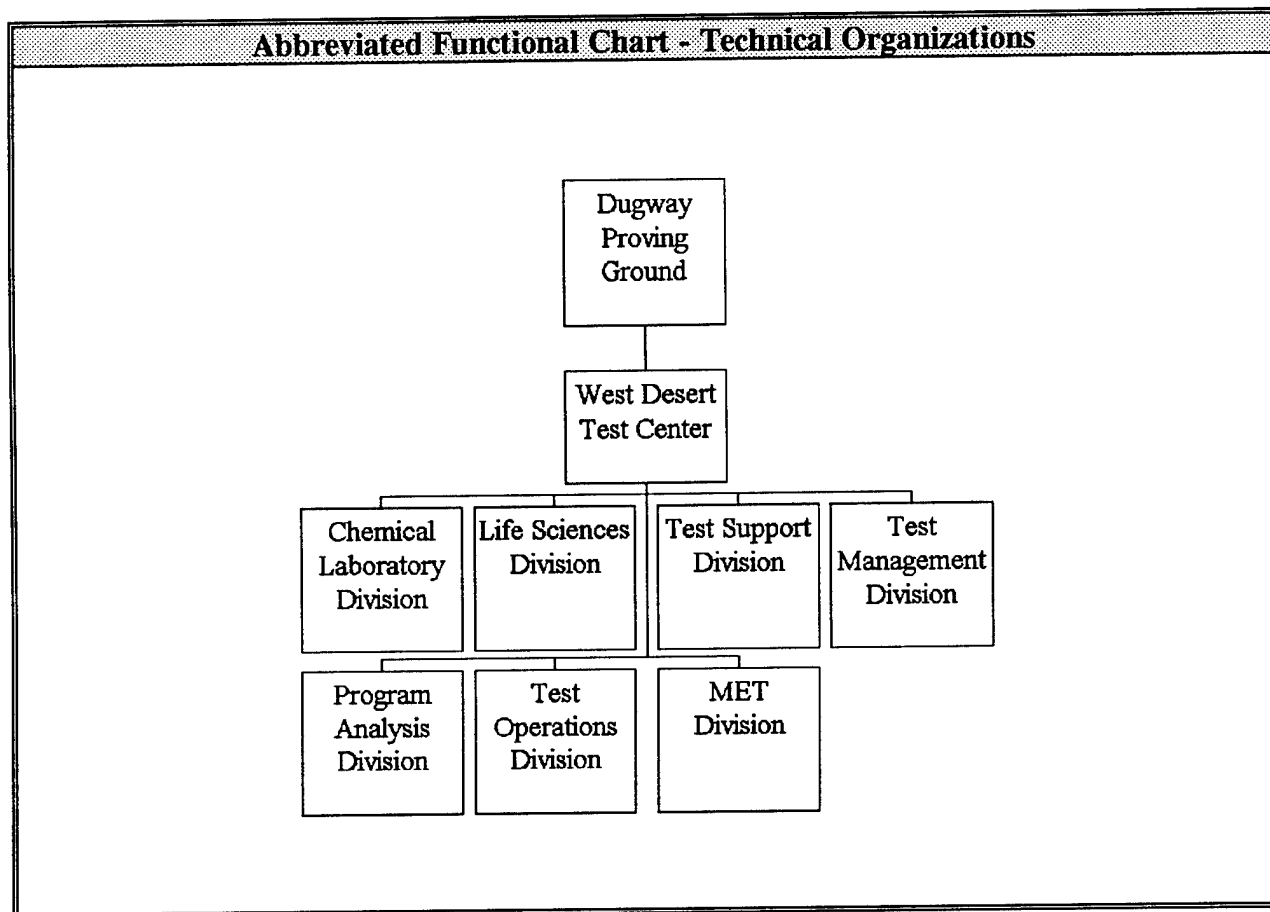
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	2	0	2	0
CIVILIAN	375	52	183	140
<b>TOTAL</b>	<b>377</b>	<b>52</b>	<b>185</b>	<b>140</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	118.896	<b>REAL PROPERTY</b>	0.000
ADMIN	60.428	* NEW CAPITAL EQUIPMENT	0.000
OTHER	29.449	<b>EQUIPMENT</b>	20.189
<b>TOTAL</b>	<b>208.773</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.709
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Dugway Proving Ground



**Dugway Proving Ground**  
Dugway, UT 84022-5000  
(801) 831-3701

Commander: COL Eugene A. Fuzy  
Executive Asst: Mr. Scot A. Bridges

#### **MISSION**

Plan, conduct, analyze and report the results of exploratory, developmental, and production tests of delivery systems and, incendiary devices. Operate the proving ground as a DoD Major Range and Test Facility Base (MRTFB). DPG is the DoD-designated Chemical and Biological Defense Test and Evaluation Reliance test site.

Test conventional and illuminating artillery, mortars and rockets, as well as land and air vehicles. Perform tests of all material commodities to assess chemical and biological hardness and contamination/decontamination survivability. Test procedures and by-products of chemical and conventional weapons demilitarization and perform tests and develop procedures for on-site verification inspections for chemical weapons treaties. Dugway provides the base of operation for the Joint Services Project, Chemical and Biological Joint Contact Point and Test, which provides chemical and biological defense information and operationally oriented tests and analyses to the Services and CINCS.

#### **CURRENT IMPORTANT PROGRAMS**

Research, development and laboratory investigations. Joint-operations chemical and biological defense tests and studies for CINCS and Services. Munitions development/acceptance and production testing. Environmental studies to support DPG and Army programs.

#### **EQUIPMENT/FACILITIES**

Instrumented grids for chemical, biological and smoke/obscurant systems. Artillery range for conventional and chemical metal parts. Ballistics and dissemination tests with field sample, sample mass analysis, meteorological (auto data acquisition and MESOMET network) system. Physical and environmental test facility (MIL SPEC 810) chambers for total agent containment. Operations supported by meteorological research on behavior of clouds. Chemical, life science technology, ecological survival of DPS. Capability for the planning, analysis, and evaluation of tests and operations research. Labs equipped for wide range of chemical, microbiological, toxicological, immunological and pollution studies. Technical and mass array of fluorescent air tracers. External-communication and range safety system. Outstanding features are: large land area, restricted air space, long and flat artillery ranges, projectile recovery, sonic and electromagnetic sterility and diverse technical and scientific skills.



Dugway Proving Ground  
Dugway, UT 84022-5000  
(801) 831-3701

Commander: COL Eugene A. Fuzy  
Executive Asst: Mr. Scot A. Bridges

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
<b>Subtotal (S&amp;T)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	33.086	24.453	57.539
6.7	0.000	0.000	0.000
Non-DOD	0.158	0.116	0.274
<b>TOTAL RDT&amp;E</b>	<b>33.244</b>	<b>24.569</b>	<b>57.813</b>
Procurement	0.288	0.207	0.495
Operations & Maintenance	3.269	5.134	8.403
Other	9.814	7.042	16.856
<b>TOTAL FUNDING</b>	<b>46.615</b>	<b>36.952</b>	<b>83.567</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	23.000

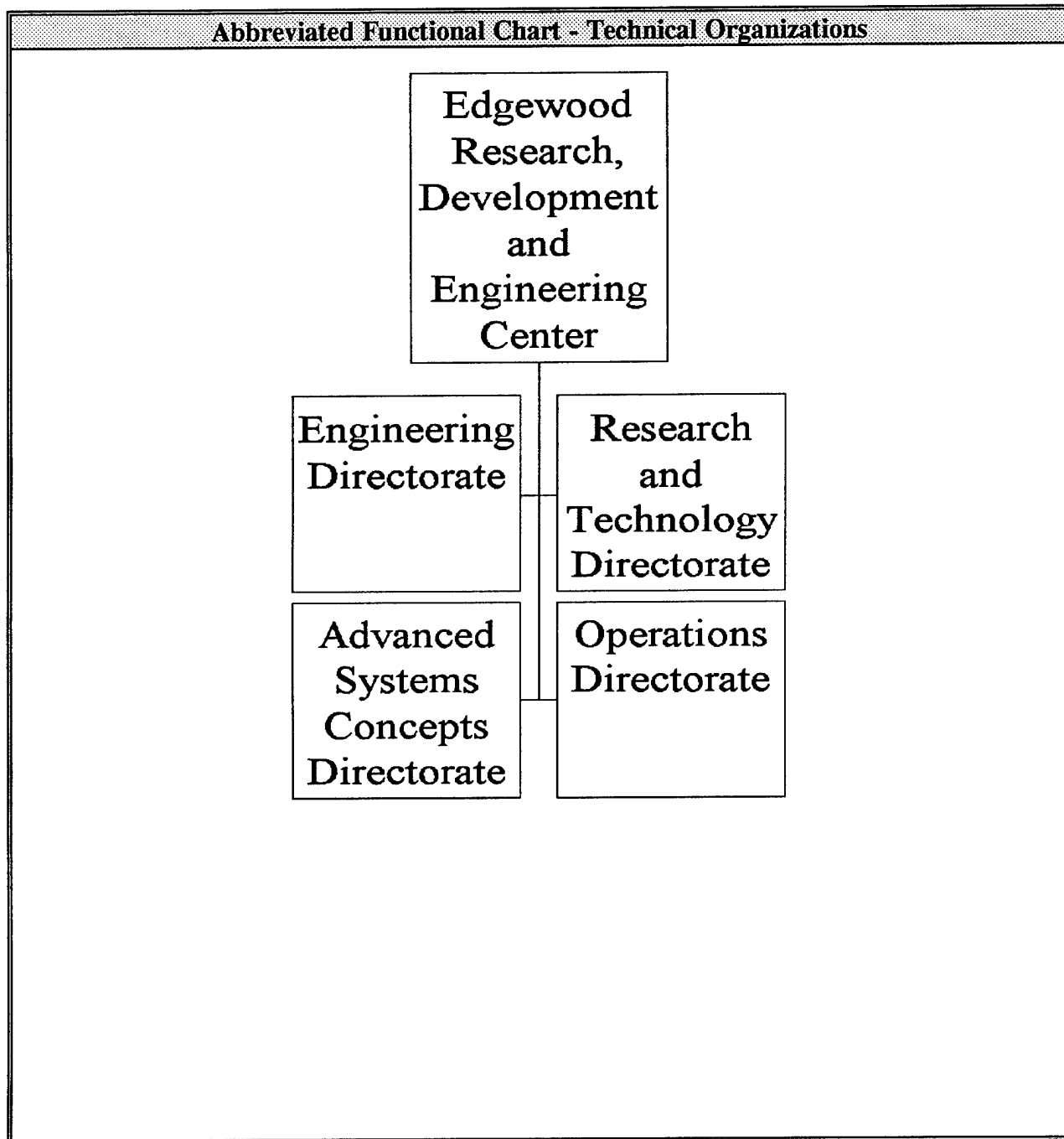
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	57	0	8	49
CIVILIAN	562	25	152	385
<b>TOTAL</b>	<b>619</b>	<b>25</b>	<b>160</b>	<b>434</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	145.000	<b>REAL PROPERTY</b>	147.000
ADMIN	179.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	2,169.000	<b>EQUIPMENT</b>	23.000
<b>TOTAL</b>	<b>2,493.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>798,855</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Edgewood Research, Development and Engineering Center



**Edgewood Research, Development and Engineering Center**

Aberdeen Proving Ground, MD 21010-5423

Technical Director: Joseph J. Vervier

(410) 671-3838

**MISSION**

A research, development and engineering center for executing the chemical and biological defense programs for the Army and the Joint Services (JS). Provide research, development and acquisition as well as life cycle engineering support for chemical/biological defense and smoke/obscurant equipment under DODD 5160.5. Act as DoD lead lab for the JS chemical/biological/smoke technology base. The Edgewood RDEC technical director is also the manager of the Edgewood NBC RDA Enterprise which includes PM NBC Defense Systems, PM Smoke/Obscurants, Program Director of Biological Defense Systems, and the Edgewood RDEC.

**CURRENT IMPORTANT PROGRAMS**

- Nuclear, Biological and Chemical (NBC) Reconnaissance, Detection and Identification.
- Individual and Collective Protection.
- NBC Decontamination.
- Smoke and Obscurants and Target Defeating Materials.
- Chemical Treaty Verification.
- Chemical and Biological Remediation.
- CB counterterrorism.

**EQUIPMENT/FACILITIES**

Major equipment is contained in a complex of R&D engineering/laboratory areas and includes: Process engineering facility; Production and facility design chamber for studies of respiratory protection design drivers; Simulant agent challenge test chamber; Rubber/elastomer mold facility; Specialized chemical agent labs; Pyrotechnic mixing, loading, handling facility; Subsonic/supersonic/transonic wind tunnel; Complete analytical chemistry (trace analysis/tandem mass spectrometry); Obscurant test chambers for transmission measurements; Laser spectroscopy lab; Robotic toxic agent lab; CAD/CAE/CAM network; Super toxic facility; Design Evaluation Chemical Surety Lab; Decontamination/Detoxification Facility; Explosive test chamber; Toxic Dissemination Test Chamber; Inhalation Toxicology Laboratories; Molecular Modeling Facility; Microland Laboratory with electron microscopy and surface spectroscopy; Experimental Fabrication Facility; Nephelometry laboratory/Single Particle Laboratory; Smoke Breeze Tunnel; Controlled Environment; Soil-Core Microism Unit Chambers; Decontamination Test Facility.

## Edgewood Research, Development and Engineering Center

Aberdeen Proving Ground, MD 21010-5423

Technical Director: Joseph J. Vervier

(410) 671-3838

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	1.451	NA	1.451
6.1 Other	2.863	1.413	4.276
6.2 IED (Navy)	NA	NA	NA
6.2 Other	20.700	16.578	37.278
6.3	1.061	0.037	1.098
<b>Subtotal (S&amp;T)</b>	<b>26.075</b>	<b>18.028</b>	<b>44.103</b>
6.4	23.582	38.015	61.597
6.5	14.855	20.562	35.417
6.6	2.581	3.330	5.911
6.7	0.000	0.000	0.000
Non-DOD	3.829	0.423	4.252
<b>TOTAL RDT&amp;E</b>	<b>70.922</b>	<b>80.358</b>	<b>151.280</b>
Procurement	17.657	78.144	95.801
Operations & Maintenance	18.352	2.185	20.537
Other	15.758	3.668	19.426
<b>TOTAL FUNDING</b>	<b>122.689</b>	<b>164.355</b>	<b>287.044</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

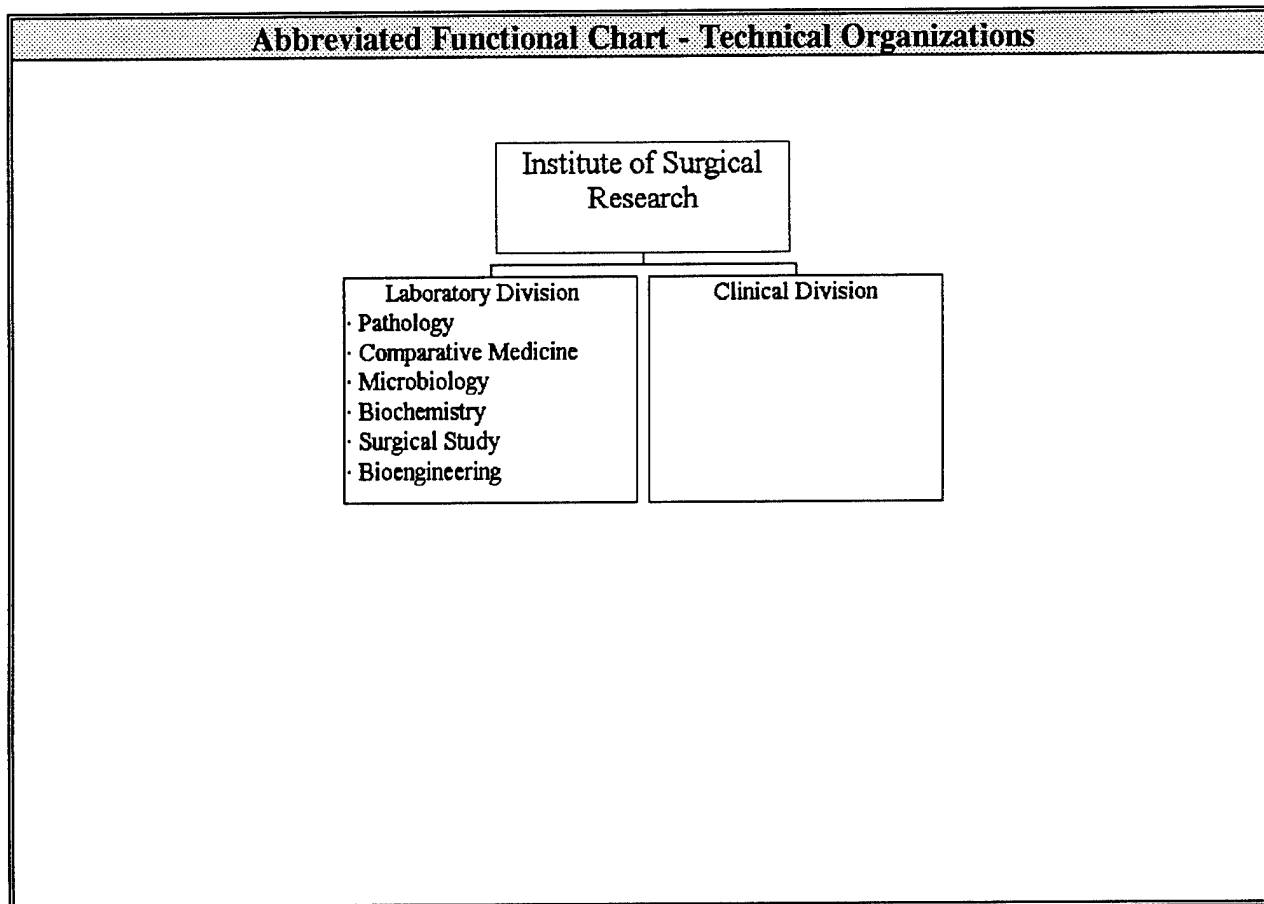
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	19	3	2	0
CIVILIAN	1,066	73	532	461
<b>TOTAL</b>	<b>1,085</b>	<b>76</b>	<b>534</b>	<b>461</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	840.000	<b>REAL PROPERTY</b>	84.800
ADMIN	288.000	* NEW CAPITAL EQUIPMENT	1.000
OTHER	352.000	<b>EQUIPMENT</b>	131.988
<b>TOTAL</b>	<b>1,480.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	22.695
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Institute of Surgical Research



**Institute of Surgical Research**

Fort Sam Houston, TX 78234-6315  
(210) 221-4819

Commander: COL John B. Ryan  
Executive Office: LTC Keith B. Parker

**MISSION**

Investigate problems of mechanical and thermal injuries with complications arising from such trauma; care for patients with such injuries; teach and train other personnel in the management of injured patients; conduct investigative studies at both the basic and clinical levels.

**CURRENT IMPORTANT PROGRAMS**

At the center of research at USAISR is the Clinical Operations Protocol which supports the care of burn patients. Thermal injury is the only human model with a quantifiable disease (dose of injury: percent of total body surface area burned), which can be stratified into acceptable statistical designs. This unique setting provides a foundation for other clinical and laboratory research protocols that investigate the pathophysiology of trauma caused by burns and their complications. The clinical protocol assures delivery of standardized care essential for controlled clinical trials. The integration of the Mechanical Trauma Research (MTR) program broadens this Institute's influence in the study of all types of trauma, including hemorrhage and resuscitation and secondary damage following hemorrhage and trauma. Another important program is the training of flight teams to provide prompt aero-medical transfer and care of injured soldiers. Taken together, this integration of physician-investigators and basic scientists allows for a foundation of basic science as well as applied science directly testable in trauma patients, and offers a highly focused, unique program for the military.

**EQUIPMENT/FACILITIES**

USAISR has an equipment hand receipt valued at \$12,000,000. The Institute consists of buildings totaling 72,500 square feet. This includes almost 17,000 square feet to support the 40-bed Burn Center located within Brooke Army Medical Center and 18,000 square feet to house the MTR Program.



## Institute of Surgical Research

Fort Sam Houston, TX 78234-6315

(210) 221-4819

Commander: COL John B. Ryan

Executive Office: LTC Keith B. Parker

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.164	NA	0.164
6.1 Other	0.998	0.000	0.998
6.2 IED (Navy)	NA	NA	NA
6.2 Other	6.311	0.000	6.311
6.3	0.281	0.000	0.281
<b>Subtotal (S&amp;T)</b>	<b>7.754</b>	<b>0.000</b>	<b>7.754</b>
6.4	0.000	0.000	0.000
6.5	0.004	0.000	0.004
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>7.758</b>	<b>0.000</b>	<b>7.758</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	7.098	0.000	7.098
<b>TOTAL FUNDING</b>	<b>14.856</b>	<b>0.000</b>	<b>14.856</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

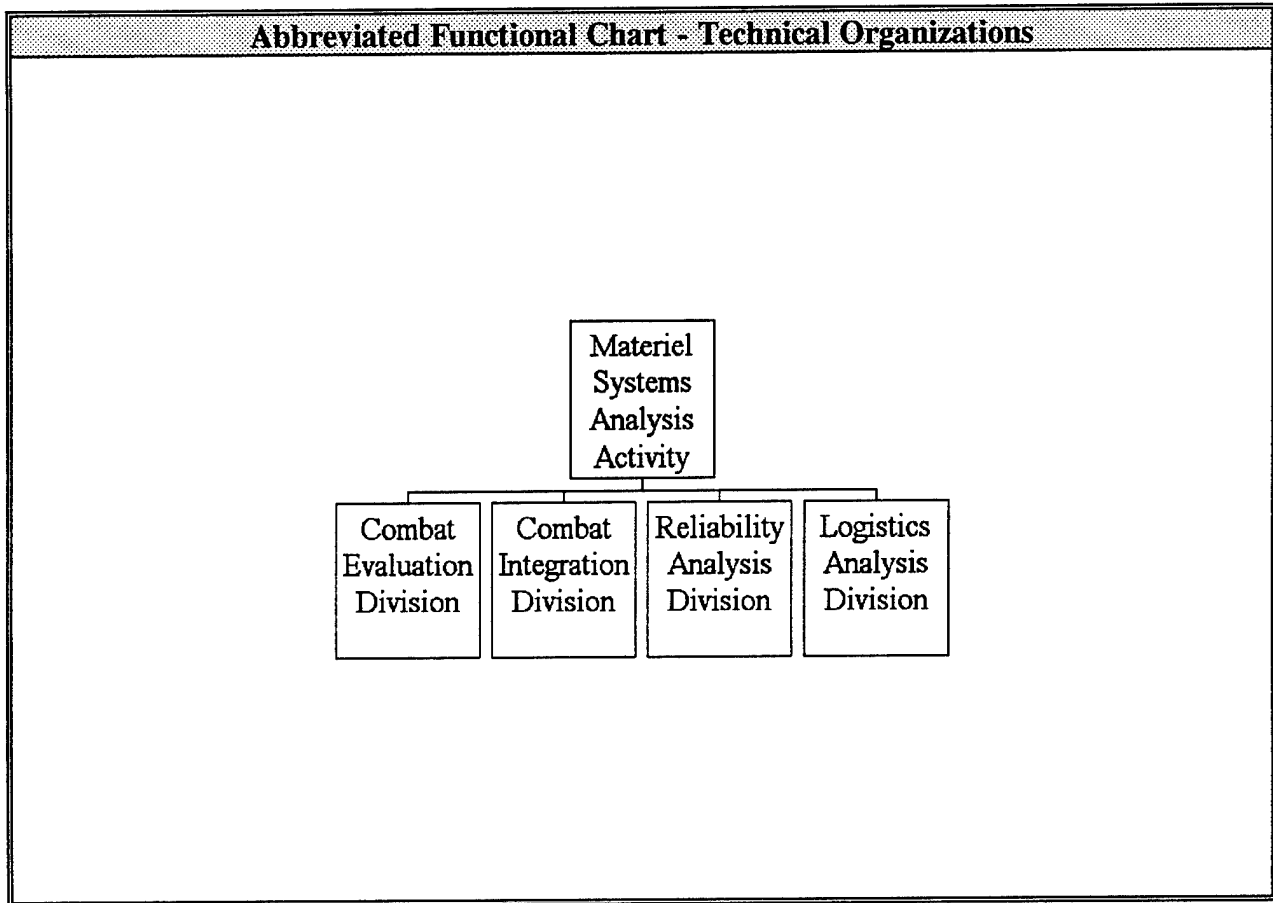
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	191	22	30	139
CIVILIAN	56	7	18	31
<b>TOTAL</b>	<b>247</b>	<b>29</b>	<b>48</b>	<b>170</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	39.000	<b>REAL PROPERTY</b>	0.000
ADMIN	6.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	17.000	<b>EQUIPMENT</b>	12.000
<b>TOTAL</b>	<b>62.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	2.000
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Materiel Systems Analysis Activity**



**Matériel Systems Analysis Activity**  
Aberdeen Proving Gnd, MD 21005-5071  
(410) 278-6614

Director: Mr. John J. McCarthy  
Military Deputy: LTC Steven J. Rawlick

### MISSION

Provide analysis for the Army to support the decision-making process.

### CURRENT IMPORTANT PROGRAMS

The U.S. Army Materiel Systems Analysis Activity (AMSAA), as the Army's center for systems analysis and independent evaluation of major systems, provides the technical capability for the conduct of materiel systems analysis. AMSAA evaluates the performance and combat effectiveness of existing, developmental and conceptual systems to support Department of the Army and other major Army commands in the conduct of cost and operational effectiveness analyses, force structure studies, risk analyses, trade-off and casualty assessment criteria. AMSAA is the HQDA designated lead agency for performance assessments (which include performance analyses, risk assessments and Reliability, Availability, and Maintainability assessments) in support of milestone acquisition decisions. AMSAA supports the Army in the development of methodologies, models, simulations, and data bases for use in Army studies and analyses. AMSAA is the Army's technical evaluator of developmental systems, and production tests for all major Defense Acquisition Board, Director Operational Test and Evaluation, and Department of the Army oversight systems, including special access programs. AMSAA provides technical independent evaluations for major milestone decisions, materiel changes, and materiel releases in support of the Army Acquisition Executive (AAE).

AMSAA performs test design, independent evaluation and materiel systems analyses for systems such as: M1A2 Abrams; PATRIOT PAC-3; Comanche, Theater High Altitude Air Defense System; Armored Gun System; Longbow; Enhanced Position Location and Reporting System; Family of Medium Tactical Vehicles; Combat Service Support Control System; Advanced Field Artillery System/Future Armored Resupply Vehicle; Javelin; Army Tactical Missile System/Brilliant Antitank Munitions; Army Tactical Command and Control Systems; All Source Analysis System; 155MM Sense and Destroy Armor.

### EQUIPMENT/FACILITIES

Tactical simulation facility for processing classified material. Simulation facility used for experimental development and validation of models and simulations. Additional equipment for use in: materiel systems analysis; item level performance analysis; weapon system effective estimates for cost and operational effectiveness analysis; technical and live fire test design; independent technical evaluation of major and designated non-major systems; methodology and computer simulation development; system life cycle surveillance and overview; primary source of technical data for major Army studies; general systems analysis for development of decision information; independent integrated logistical support evaluations for determination of Army staff positions; field exercise and sample data collection; inventory modeling; general logistics, provisioning, support and readiness analysis; and coordination of joint munitions effectiveness methodology and data (joint technical coordinating group).

**Materiel Systems Analysis Activity**  
 Aberdeen Proving Gnd, MD 21005-5071  
 (410) 278-6614

Director: Mr. John J. McCarthy  
 Military Deputy: LTC Steven J. Rawlick

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
<b>Subtotal (S&amp;T)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	21.485	7.703	29.188
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>21.485</b>	<b>7.703</b>	<b>29.188</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	4.248	0.960	5.208
Other	2.903	0.768	3.671
<b>TOTAL FUNDING</b>	<b>28.636</b>	<b>9.431</b>	<b>38.067</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

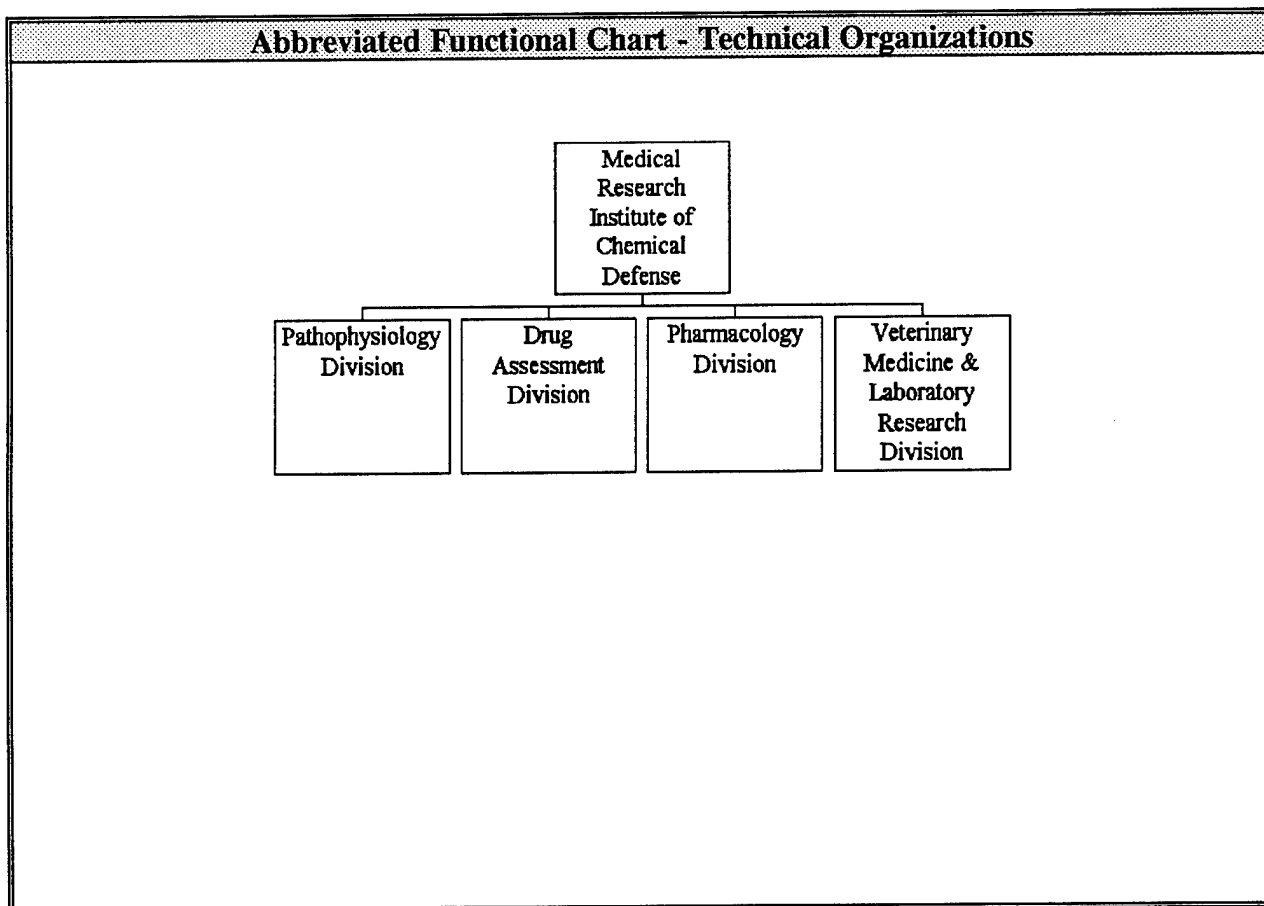
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	16	0	11	5
CIVILIAN	395	12	292	91
<b>TOTAL</b>	<b>411</b>	<b>12</b>	<b>303</b>	<b>96</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	0.000	<b>REAL PROPERTY</b>	3.596
ADMIN	115.281	* NEW CAPITAL EQUIPMENT	0.000
OTHER	17.064	<b>EQUIPMENT</b>	7.790
<b>TOTAL</b>	<b>132.345</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>4</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Medical Research Institute of Chemical Defense



**Medical Research Institute of Chemical Defense**  
Aberdeen Proving Gr, MD 21010-5425  
(410) 671-3276

Commander: COL James S. Little  
Deputy Cdr: COL David H. Moore

#### **MISSION**

The U.S. Army Medical Research Institute of Chemical Defense is the U.S. Army Medical Research and Materiel Command's lead laboratory responsible for conduct of research as it relates to medical defense against chemical warfare (CW). This mission includes: fundamental and applied research on mechanisms of action of CW threat agents, candidate pretreatment, treatment, and personal or skin decontamination compounds in order to establish a scientific and technical base from which to plan and formulate enhanced medical countermeasures to CW threats and improved prevention and treatment modalities for CW casualties; test and evaluation of drugs, decontaminants, and medical equipment in development for the prevention, resuscitation, treatment, and management of chemical casualties; assistance in the integration of the concepts and products from these research, development, test, and evaluation mission activities into the logistical system, doctrine and organizational development, and training; and training of both medical and non-medical personnel in the prevention and management of chemical casualties. In addition, the Institute has the mission to conduct research on medical defense against low molecular weight toxins.

#### **CURRENT IMPORTANT PROGRAMS**

Research programs at this Institute emphasize preservation of combat effectiveness by timely provision of medical countermeasures to chemical warfare (CW) agents in response to D.A. and DOD requirements. These programs maintain the technologic capability to meet present requirements and to counter future CW and neurotoxin threats, provide individual level prevention and protection against these threats, and enhance the medical management of CW and neurotoxin casualties, enhancing survival and expediting and maximizing return to duty.

The Institute conducts basic research, exploratory development, non-system development, and, on a reimbursable basis, advanced development of medical countermeasures for CW and neurotoxin agents; investigates the biomedical effects of CW agents, neurotoxins, and candidate medical countermeasures to these threats; conducts safety and efficacy studies of candidate pretreatment and prophylactic countermeasures; develops analytical technologies for medical countermeasures, and performs advanced research into CW and neurotoxin casualty care technology. We have met the FY96 objective to exploit pathophysiological database and new technologies for prophylaxis and pretreatment to identify novel strategies to provide significant protection against vesicant injury, and are on target to meet the FY00 deadline to demonstrate safety and efficacy of a candidate medical countermeasure sufficient for a Milestone (MS) 0 transition. We met the FY94 deadline for MS 0 demonstrating the safety and efficacy of a methemoglobin for pretreatment against cyanide, and made a MS 1 transition in FY95.



**CURRENT IMPORTANT PROGRAMS (continued)**

The search for additional cyanide countermeasures is presently in technology watch. Our rapid progress in development of mutant human butyrylcholinesterase variants as biological scavengers for nerve agents will enable this Institute to demonstrate the safety and efficacy sufficient for a MS 0 transition of new nontoxic antidote and/or pretreatment for nerve agents by FY02. We will demonstrate, by FY97, safety and efficacy sufficient for a MS 0 transition of the technology for an advanced anticonvulsants adjunct or component for the soldier/buddy-use nerve agent antidote. Advanced anticonvulsants will overcome deficiencies of current anticonvulsants in that they will be more effective in stopping on-going seizures, in preventing their reoccurrence, and in protecting against nerve agent-induced, seizure-related brain damage. They will also demonstrate less abuse potential than the current anticonvulsant. Candidate advanced anticonvulsants are presently undergoing evaluation. Efforts to demonstrate safety and efficacy sufficient for a MS 0 transition of the technology for a reactive topical skin protectant that will provide protection against penetration and will detoxify both vesicant and nerve CW agents by FY99 are on track. This product will represent a significant increment in protection over the topical skin protection which is presently in advanced development. This Institute has developed a pathophysiology database on respiratory agents, and has merged this effort with Chemical Casualty Management beginning in FY96. The Chemical Casualty Management effort focuses on clinical issues impacting the presentation, diagnosis, progression, and medical management of CW casualties in the field. MS 1 transition of a field cholinesterase diagnostic kit is expected in FY97, while MS 0 transition of a methemoglobin monitoring kit during this FY is anticipated.

**EQUIPMENT/FACILITIES**

Chemical casualty care training, physiology, drug assessment, pathophysiology, pharmacology, analytical chemistry, neurotoxicology, veterinary surgery, chemical safety/surety, medical maintenance, information and resource management, supply and quality assurance. Technical library with 6,000 books, 1,000 journal titles, and many databases. Video facility, computer facility and 7,000 sq ft animal facility; Radioisotope chemical antidote and biochemical analysis; Histochemistry; Behavioral testing; drug screening; Pharmacokinetics; Molecular modeling; Liquid, gas, column and affinity chromatography; Quantitative image enhancement/analysis; Electrophoresis, spectroscopy, fluorometry and spectropolarimetry; GC mass spectrometry; Electron spin resonance and peptide synthesis/sequencing; Amino acid analysis; Monoclonal hapten antibodies; Electron, scanning and X-ray microscopy; Cell cloning; Receptor analysis.

**EQUIPMENT/FACILITIES (continued)**

**Major Facilities and Equipment:**

**Building E-3100:** Main Medical Chemical Defense Research Laboratory and Administrative Building

**Building E-3081:** Unique to DOD. Contains a Chemical Surety Materiel Laboratory for Medical Chemical Defense Research

**Building E-3156:** Large Animal Holding/Chemical Research Facility

**Building E-3244:** Biotoxin Research Facility

**Building E-3103/E-3106:** Chemical Casualty Care Training Facility

**Building E-3103/Classroom:** Chemical portion of the Management of Chemical and Biological Casualties Course (6H-F26) is conducted here.

**Building E-3101:** Administrative Facility: Surety, Safety, Environment, and Contract Management

**Hazardous Materiel Storage and 90-Day Hazardous Waste Sites:** These sites meet stringent specifications which conform to the environmental requirements for the storage and disposition of chemicals and hazardous materials.

**EQUIPMENT/FACILITIES (continued)**

Building E-3105: Information Management Support Facility

Building E-3107: Toxic Materiel Turn-in Facility

Building E-3104: Environmentally Controlled Building for Electronic Equipment

Building E-2180: Equipment Storage and Turn-in Facility

Building E-3083: Equipment storage for Medical Chemical and Biological Casualties course

Building E-5244: Environmentally Controlled Tape and Electronic Storage Facility

Building E-5826: Animal Care Equipment Storage Facility

Building E-3221: Turn-in Facility

Direct Digital Control HVAC System: System provides constant control and 24-hour remote monitoring of chemical fume hoods in the Surety Area of building E-3081, controls HVAC throughout remainder of laboratories and administrative areas, and controls and remotely monitors all animal rooms in buildings E-3081, E-3100, E-3156, and E-3244.

Walk-in Coolers: Storage of chemicals used for research.

Chillers, Building E-3081: Installed in 1994 to meet EPA requirements. Each unit produces 350 tons of cooling using 123 refrigerant.

Chillers, Building E-3100: Installed in 1994 to meet EPA requirements. Each unit produces 350 tons of cooling using 123 refrigerant.

Medical Waste Incinerator: Required to burn animal bedding, carcasses, and medical waste generated by the Institute.

Air Compressor: Required to supply laboratories with bench air for research.

Chemical/Biological/Radiological (CBR) Filter Trains: Provided for all 77 chemical/biological hoods located in buildings E-3100, E-3081, and E-3244. Each CBR filter train consists of a housing unit containing prefilter, as well as the appropriate number and size of High Efficiency Particulate (HEPA) and High-Efficiency Gas-Phase Absorber (HEGA) filters. All filter trains are in support of the Chemical/Biological Defense Program and are in compliance with Environmental Protection Agency, State, and Federal Standards.

**EQUIPMENT/FACILITIES (continued)**

Exterior Walk-in: Storage of animal carcasses prior to incineration.

Auxillary Chillers: Provides renovated laboratories with additional cooling to support electronic equipment.

Building E-3106: Chemical Casualty Care Training Facility Exterior

Decontamination Showers Required to conduct research in accordance with regulations.

Building E-3156/Associated Animal Pens: Required for the care of animals used in research.

Building E-3156 Animal Room: Required for the care of animals used in research.

House Water Distillation System: This central system feeds water to satellite polishing systems in the individual laboratories. Pure laboratory water is needed in virtually all segments of laboratory research. High-purity water is used for reagent buffers and sensitive instrumental analyses (such as High Pressure Liquid Chromatograph, Gas Chromatograph/Mass Spectrometer, as well as in washing and/or preparing biological solutions such as media for tissue culture.

Hazardous Materiel and 90-Day Hazardous Waste Sites: These sites meet stringent specifications which conform to the environmental requirements for the storage and disposition of chemicals and hazardous materials.

Building E-3100 Emergency Generator: Provides emergency power for lighting, freezers, incubators, and other specialized equipment which must remain operational.

Administrative and Laboratory Emergency Generator: Provides emergency power for lighting, freezers, incubators, and other equipment which must remain operational.

Surety Area Back-up Generator: Supplies emergency power to the entire chemical surety wing to include all fume hoods, heating, ventilation and air conditioning systems, and electrical systems.

Uninterruptable Power System (UPS): System supplies immediate power to the fume hood exhaust blowers in the chemical surety area until the emergency generator starts and transfers power.

Surety Area Holding Tanks: Consists of two 10,000 gallon tanks which hold all waste water generated in the surety wing. This ensures that chemical spills will not escape into the sanitary sewer.

**Medical Research Institute of Chemical Defense**  
 Aberdeen Proving Gr, MD 21010-5425  
 (410) 671-3276

Commander: COL James S. Little  
 Deputy Cdr: COL David H. Moore

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.076	NA	0.076
6.1 Other	2.892	5.199	8.091
6.2 IED (Navy)	NA	NA	NA
6.2 Other	11.767	3.292	15.059
6.3	2.521	10.542	13.063
<b>Subtotal (S&amp;T)</b>	<b>17.256</b>	<b>19.033</b>	<b>36.289</b>
6.4	0.263	0.000	0.263
6.5	0.020	0.000	0.020
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>17.539</b>	<b>19.033</b>	<b>36.572</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>17.539</b>	<b>19.033</b>	<b>36.572</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	56	20	4	32
CIVILIAN	159	33	24	102
<b>TOTAL</b>	<b>215</b>	<b>53</b>	<b>28</b>	<b>134</b>

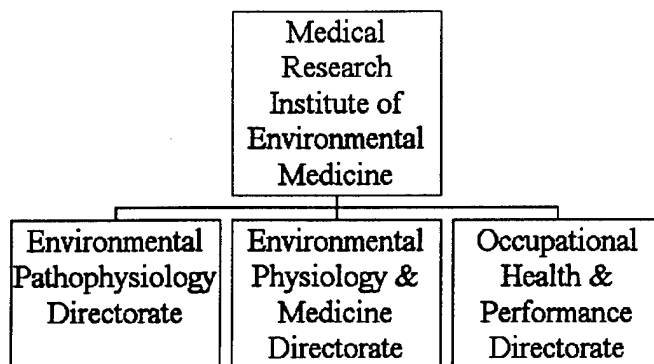
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	37.419	<b>REAL PROPERTY</b>	23.400
ADMIN	38.433	* NEW CAPITAL EQUIPMENT	1.600
OTHER	125.024	<b>EQUIPMENT</b>	0.000
<b>TOTAL</b>	<b>200.876</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>30</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Medical Research Institute of Environmental Medicine

Abbreviated Functional Chart - Technical Organizations



**Medical Research Institute of Environmental Medicine**

Natick, MA 01760-5007

(508) 651-4811

Commander: COL Joel T. Hiatt

Executive Officer: MAJ Mary L. Ramos

**MISSION**

Conduct research to determine the effects of heat, cold, high terrestrial altitude, nutrition and work upon the soldiers life process, performance and health. Defense interaction of environmental stresses.

**CURRENT IMPORTANT PROGRAMS**

**Environmental Injury:** Demonstrate the efficacy of strategies to prevent and treat environmental illnesses, injuries and performance decrements.

**Performance Limits:** Develop and validate models to predict the effects of heat, cold, high altitude, hydration, nutritional status, and clothing and individual equipment on performance.

**Nutritional Strategies:** Identify and demonstrate nutritional strategies to maintain health and soldier performance.

**Musculoskeletal Injuries and Physical Performance:** Demonstrate the efficacy of methods to reduce the incidence of musculoskeletal injuries and optimize performance during military training and operations. Special emphasis is being placed on Defense Women's Health Research.

**Medical Chemical Defense:** Investigate and define mechanism(s) of vesicant injury.

**EQUIPMENT/FACILITIES**

The major equipment and facility capabilities of the laboratory include, but are not limited to two (2) large altitude chambers, fourteen (14) small climatic chambers, a new human psychology laboratory, and a new biomechanics laboratory, developed jointly with the U.S. Army Natick Research, Development and Engineering Center, American Association for Accreditation of Laboratory Animal Care (AAALAC) accredited animal care facilities, electron microscope, underwater research pool, copper manikins, and diverse pharmacological and psychological measuring equipment. The Institute maintains field facilities on the summit of Pikes Peak, CO.



## Medical Research Institute of Environmental Medicine

Natick, MA 01760-5007

(508) 651-4811

Commander: COL Joel T. Hiatt

Executive Officer: MAJ Mary L. Ramos

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.077	NA	0.077
6.1 Other	2.101	0.000	2.101
6.2 IED (Navy)	NA	NA	NA
6.2 Other	3.841	0.678	4.519
6.3	1.704	0.000	1.704
Subtotal (S&T)	7.723	0.678	8.401
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	7.723	0.678	8.401
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.757	0.000	0.757
TOTAL FUNDING	8.480	0.678	9.158

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	66	18	11	37
CIVILIAN	81	28	26	27
TOTAL	147	46	37	64

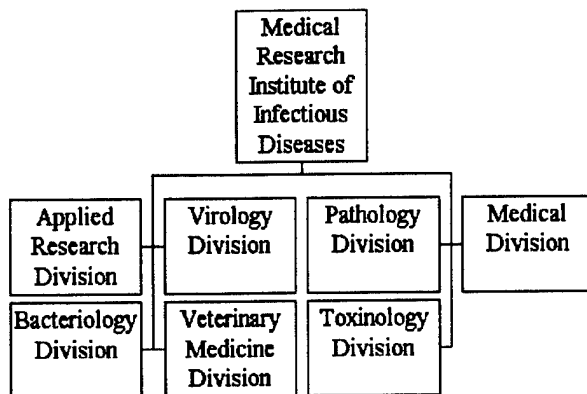
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	47.093	REAL PROPERTY	25.550
ADMIN	5.940	* NEW CAPITAL EQUIPMENT	0.000
OTHER	35.714	EQUIPMENT	24.020
TOTAL	88.747	* NEW SCIENTIFIC & ENG. EQUIP.	0.022
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Medical Research Institute of Infectious Diseases

Abbreviated Functional Chart - Technical Organizations



**Medical Research Institute of Infectious Diseases**  
Fort Detrick, MD 21702-5011  
(301) 619-2833

Commander: COL David R. Franz  
Deputy Cdr: COL Gerald W. Parker

### **MISSION**

To conduct research and develop strategies, products, information and training for medical defense against biological warfare threats and against naturally occurring infectious agents of military importance that require special containment. The Institute is the lead laboratory in the Medical Biological Defense Research Program and participates in crucial aspects of the Infectious Disease Research Program.

### **CURRENT IMPORTANT PROGRAMS**

Development of medical countermeasures for biological warfare threats continues to be the highest mission priority. New vaccine candidates for plague, anthrax, staphylococcal enterotoxin B, Venezuelan equine encephalitis, and botulinum toxins have been generated using genetic engineering approaches and are in various stages of advanced preclinical testing. Molecular modelling allowed identification of an excellent candidate vaccine for staphylococcal enterotoxin A. Pivotal efficacy studies of the Q fever vaccine (CMR) were performed in support of proposed licensure of the vaccine. Diagnostic assays for confirmatory tests received high priority, with a systematic approach to standardizing procedures and addressing significant biological warfare and infectious disease threats.

### **EQUIPMENT/FACILITIES**

Three buildings provide 347,000 square feet with approximately 15% of the laboratory space capable of operation at biosafety level 3 and approximately 3% capable of operation at biosafety level 4 (maximum containment). These containment laboratories are a unique international resource for the safe study of high hazard disease agents, and are the only such laboratories within the DOD. Other unique facilities include: a 16-bed clinical research ward; high containment patient care facility and support functions; containment patient care facility and support functions; contained dynamic aerosol laboratory exposure systems; cell culture and hybridoma laboratory; electron microscopy and mass spectrometry equipment. The laboratory facilities also include a small farm for the care and housing of large animals used in research.

## Medical Research Institute of Infectious Diseases

Fort Detrick, MD 21702-5011

(301) 619-2833

Commander: COL David R. Franz

Deputy Cdr: COL Gerald W. Parker

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	1.615	NA	1.615
6.1 Other	6.761	0.105	6.866
6.2 IED (Navy)	NA	NA	NA
6.2 Other	5.511	0.005	5.516
6.3	10.645	0.010	10.655
<b>Subtotal (S&amp;T)</b>	<b>24.532</b>	<b>0.120</b>	<b>24.652</b>
6.4	0.606	0.000	0.606
6.5	0.167	0.000	0.167
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>25.305</b>	<b>0.120</b>	<b>25.425</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>25.305</b>	<b>0.120</b>	<b>25.425</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

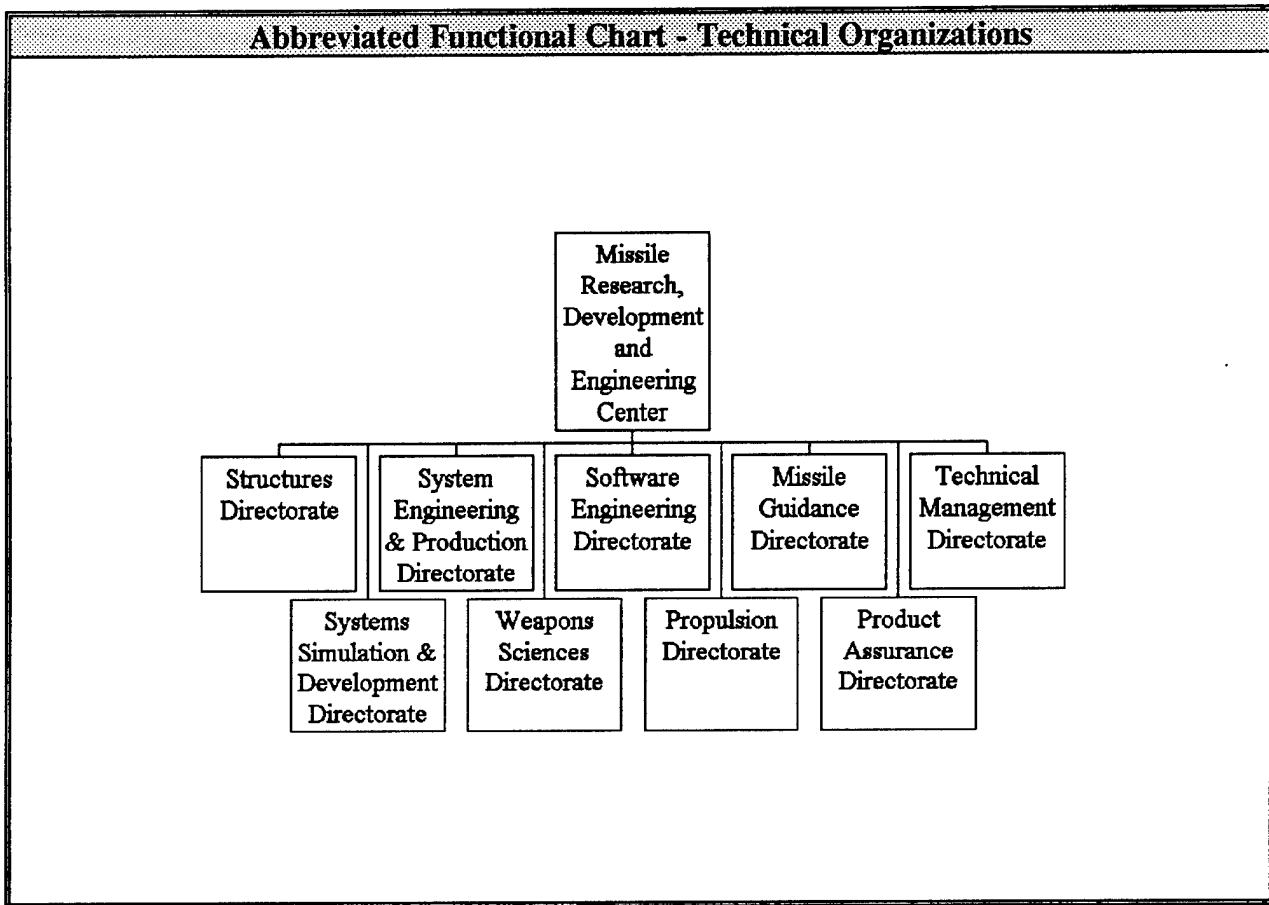
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	291	44	5	242
CIVILIAN	215	48	37	130
<b>TOTAL</b>	<b>506</b>	<b>92</b>	<b>42</b>	<b>372</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	121.000	<b>REAL PROPERTY</b>	23.962
ADMIN	78.000	* NEW CAPITAL EQUIPMENT	1.500
OTHER	148.000	<b>EQUIPMENT</b>	40.306
<b>TOTAL</b>	<b>347.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	1.600
<b>ACRES</b>	<b>150</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Missile Research, Development & Engineering Center



**Missile Research, Development & Engineering Center**

Redstone Arsenal, AL 35898-5241  
(205) 842-2201

Tech. Director: Dr. William C. McCorkle  
Assoc. Director: Dr. Richard G. Rhoades

**MISSION**

To plan, manage and conduct research, exploratory and advanced development for guided missile and rocket weapon systems and related components; to provide scientific, engineering, and technical support for weapon system programs over the complete life cycle; and to manage computer resources embedded in battlefield automated systems. MRDEC provides the technical expertise to enable the services to be smart buyers and users of missiles, rockets, unmanned vehicles and their unique command and control systems, directed energy, non-lethal technology, computer resources embedded in battlefield automated systems, and related models and simulation and, as such, is an essential part of the acquisition process.

MRDEC's science and technology mission includes planning, managing, and conducting research, advanced development, and exploratory investigation in response to the Army's system needs. MRDEC's national defense mission includes mutually beneficial relationships with the private sector for those areas where parallel paths should be and can be reduced by cooperation. MRDEC's life cycle systems engineering mission includes planning, establishing, and managing the Missile Command programs to maintain high readiness status, assure effectiveness of fielded systems, and control both acquisition and O&S costs. Selective research and component development is conducted to generate new manufacturable technology, reduce development lead time and system cost, and improve reliability.

MRDEC is the Army's lead organization for technologies in missile propulsion, guidance and control/terminal homing, high energy lasers, missile systems simulation, and unmanned vehicles. MRDEC is the System Integrator for the Joint Program Office for Unmanned Aerial Vehicles. MRDEC has the DoD Lead in the Rapid Force Projection Initiative (RFPI), a major Advanced Concept and Technology Demonstration (ACTD) that includes AMC-wide simulation/demonstration/residual support. In addition, MRDEC is the lead Center within the U.S. Army Materiel Command for the Early Entry, Lethality, and Survivability Battle Lab at Fort Monroe, Virginia.

**VISION:** Weapon System Technology for Decisive Victory without Casualties.

**STRATEGIC GOALS:**

1. Demonstrate technical and operational feasibility of new systems concepts that significantly enhance warfighting capabilities by integration of enabling technology into demonstration efforts.
2. Strengthen the science and technology base. Focus on the new realities.
3. Broaden the marketplace and increase market share.
4. Improve the affordability and quality of MRDEC products and engineering services.

**ENABLING STRATEGIES:**

1. Keep workforce fully engaged in state-of-the-art technology work to preserve capability as smart buyer.
2. Develop a superior workforce and a quality environment.



**CURRENT IMPORTANT PROGRAMS**

**Ducted Rocket Engine (DRE)** - This effort is a joint research and development program with Japan to develop and demonstrate a ducted rocket engine for medium surface-to-air missile to significantly increase the intercept envelope against aircraft, cruise missiles, and tactical ballistic missiles when compared to surface-to-air missiles using current solid rocket propulsion technology.

**Long Range Fiber Optic Guided Missile (LONGFOG)** - This program will provide a 40 km day/night, multiple and high value time sensitive point target strike capability while inflicting minimum collateral damage. The LONGFOG system will provide the capability to select priority targets after launch, conduct limited man-in-the-loop BDA, and provide target area reconnaissance in addition to target attack by means of variable cruise velocity over areas of interest.

**Hypervelocity Missile Guidance** - The MRDEC Hypervelocity Missile Tech Demo program successfully conducted a controlled MACH 5+ Advanced Kinetic Energy Missile (ADKEM) flight test in FY95. The successful flight demonstration verified boost phase operation of all critical miniature guidance component technology. The goal of the program was to provide technology for a multi-mission kinetic energy missile with 3-5 times the kinetic energy of current tank cannon munitions.

**Automatic Target Recognition (ATR) Optical Processing TD** - This program will demonstrate an advanced optical processor prototype to implement real-time signal processing of target acquisition data from multiple sources including second generation infrared imagers, millimeter wave (MMW) radar, synthetic aperture radar etc., enhancing lethality/survivability of future weapon systems. This demonstration will achieve high probability of recognition (95%) WITH LOW FALSE ALARM RATE (7%). There is no currently fielded ATR processing capability.

**The Army Combined Arms Weapon Systems (TACAWS)** - This project provides for the demonstration of advanced tactical missile technologies including seekers, propulsion, airframes, warheads, and guidance and control. The project will demonstrate lightweight multi-role missile technology in support of ground-to-ground, ground-to-air, air-to-air, and air-to-ground missions. Combined, flexible capability allows one system or variants of one system to replace many, realizing potential extensive savings in development costs, logistics, training, etc. The TACAWS demonstration program will transition technology to the TOW Follow-on Engineering and Manufacturing Development (EMD), (Follow-on-to-TOW (FOTT)) program beginning in FY96/97, the EFOG-M ATD program in FY97/98, and the Joint Advanced Weapons System (JAWS), an Army/Marine Corps multi-purpose, multi-platform missile.

**Guided MLRS ATD** - This program will demonstrate a low cost guidance and a control package for the MLRS rocket. At extended ranges, large quantities of baseline rockets are required to defeat the target. With the addition of a guidance system, an improved delivered accuracy will be achieved. The number of rockets required to defeat the target will be reduced to one-sixth the current quantity at maximum ranges.

**CURRENT IMPORTANT PROGRAMS (continued)**

**Multi-Purpose Individual Munition** - The challenge is to integrate the USMC SRAW flight module and MPIM warhead technologies into a system with a carry weight of <20lbs., meet the lethality and fire from enclosure requirements, and be affordable. Measure of performance is the capability to be lethal against a variety of diverse targets which allow the soldier to carry only one weapon in lieu of three weapons. This will provide a replacement missile system for the M72 LAW and AT-4 weapon systems and increase lethality and survivability of the dismounted soldier.

**Rapid Force Projection Demonstration** - The integrated system of systems concept of the ACTD provides lightweight, responsive precision fires to destroy threat armor forces during day, night, and adverse weather. This ACTD will evaluate the value added by the insertion of these new technologies into the force structure of an existing light unit in a lift constrained environment. The inserted systems will consist of forward sensors (hunters), advanced C2, and a suite of standoff killers.

**CRDAs:**

Comprehensive Tolerance Optimization and Variability Reduction (TOVAR) process and methodology model which can be integrated into both product development and production processes.

Components and algorithms required for demonstration of a diverse pattern recognition system using optical processors.

Increasing the production rate and improving the C(60) reactor process for Radar Absorbing Materials (RAM)

Advanced analytical design methodology and design tool that optimizes the structural performance of components made of composite materials by tying material properties directly to the manufacturing process.

Analysis of designs, and fabrication and test of these designs of binary optic elements for utilization in unique state-of-the-art optical systems.

Advanced manufacturing processes and equipment in the areas of microelectronics and photonics.

Integrate diagnostic and testability computer programs for electronic designs on UNIX based systems and work stations.

**TECHNOLOGY TRANSFERS:**

An electronic communication interface between a personal computer and combat radio.

Fullerene processes and coating materials that reduce radar clutter and interference on bridge supports, allowing boat-mounted radars to see these hazards and avoid collisions.

Assist Forest Service in developing an imaging infrared capability for their fire fighting air attack airplanes.

**EQUIPMENT/FACILITIES**

**Propellant Mechanical Properties Facility** - This is the most modern facility in the world dedicated to solid rocket motor structural integrity and service life extension investigation. Completed in 1988, it meets DoD's latest safety requirements for handling hazardous propulsion materials

**Target and Seeker Measurement Facility (TSMF)** - Used by the Army and Air Force for sensor/seeker design measurements, this facility includes a 300 foot tower and elevator combination allowing an operator access to equipment at any elevation up to the maximum. It also includes a 70 ton capacity target turntable with multiple degrees of freedom.

**Advanced Simulation Facility** - This facility is unequalled in the free world providing hardware-in-the-loop-simulation across the electromagnetic spectrum. It enjoys an international reputation with the countries of France, Britain, Germany, Belgium, and Israel.

**Guidance and Control Analysis Facility** - An all digital facility for check out of flight systems, this capability is unprecedented in its system bandwidth. It is currently used for real time check out of extremely high bandwidth ADKEM guidance and control components.

**Anechoic RF Test Chamber** - This facility is world renowned for its wide anechoic bandwidth and physical size. A specially designed floor provides realistic simulation of surface wave propagation - a unique capability.

**Fire Support System Integration Lab** - Designed for end-to-end weapon system hardware check out, this facility contains distributed, netted communication nodes which can perform high and low level system tests. The facility is currently uniquely configured to check out the MLRS family of munitions.

**Army Missile Optical Range** - A one of a kind, very large aperture (2m) compact laser range capable of illuminating large targets, under simulated far field conditions, at short range. This facility is used extensively for measurement of Strategic Defense Targets.

**EQUIPMENT/FACILITIES (continued)**

UAV System Integration Laboratory - A world class facility unique in its ability to integrate multiple UAV systems and test common subsystem integration interfaces.

Air Defense Interoperability Test Facility - Designed for weapon system software check out, this is the only facility in the U.S. Government having, in residence, all Army deployed tactical air defense systems (Patriot, AN/TSQ-73, HAWK with radars) and regularly conducts inter-Service and intra-Army testing.

Composites Manufacturing Facility - Wholly Government owned and operated, the Composites Manufacturing Facility provides MRDEC engineers with a "hands on" capability in missile composites manufacturing from project concept, through fabrication, and testing. This facility is the Government's principal repository of technical expertise in this area.

Propellant Signature Characterization Facility - This environmentally controlled "smoke tunnel" is used by all Services to evaluate contractor propellants and conduct detailed analysis of propellant insensitive munition properties.

Automated Manufacturing Cells - Contains a uniquely automated, fiberoptic winding capability and a cell for automated inspection of printed circuit boards down to 1-2 mils line width.

Laser Induced Chemistry Facility - Unique facility which includes lasers covering ultraviolet to infrared and analytical instrumentation to identify compounds resulting from laser induced reactions.

**Missile Research, Development & Engineering Center**

Redstone Arsenal, AL 35898-5241  
(205) 842-2201

Tech. Director: Dr. William C. McCorkle  
Assoc. Director: Dr. Richard G. Rhoades

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.771	NA	0.771
6.1 Other	1.512	2.516	4.028
6.2 IED (Navy)	NA	NA	NA
6.2 Other	11.781	36.642	48.423
6.3	10.665	120.941	131.606
<b>Subtotal (S&amp;T)</b>	<b>24.729</b>	<b>160.099</b>	<b>184.828</b>
6.4	15.411	38.911	54.322
6.5	7.881	11.009	18.890
6.6	3.055	11.248	14.303
6.7	7.264	12.655	19.919
Non-DOD	0.009	0.173	0.182
<b>TOTAL RDT&amp;E</b>	<b>58.349</b>	<b>234.095</b>	<b>292.444</b>
Procurement	43.228	21.452	64.680
Operations & Maintenance	14.411	17.777	32.188
Other	10.894	27.674	38.568
<b>TOTAL FUNDING</b>	<b>126.882</b>	<b>300.998</b>	<b>427.880</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

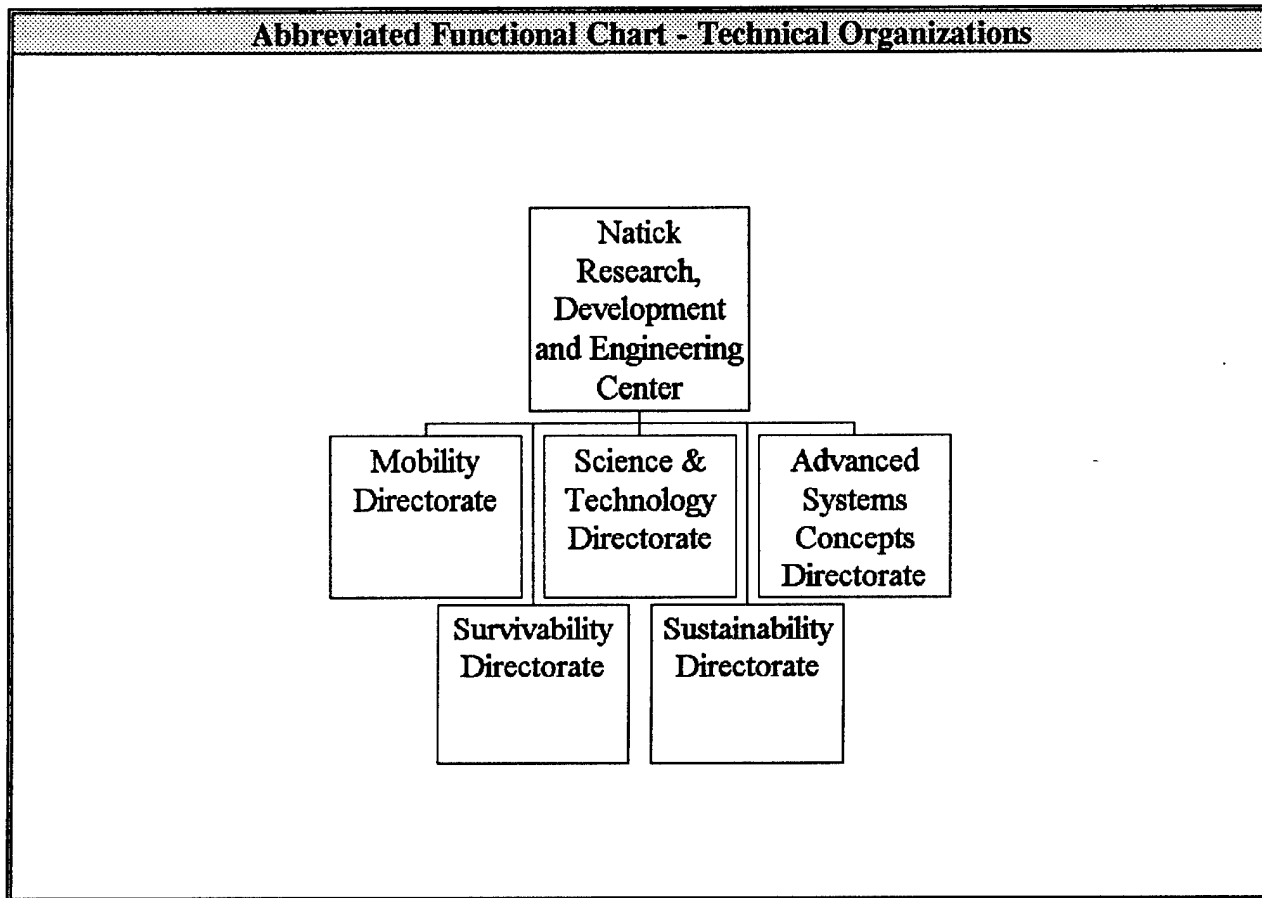
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	16	0	11	5
CIVILIAN	2,069	59	1,289	721
<b>TOTAL</b>	<b>2,085</b>	<b>59</b>	<b>1,300</b>	<b>726</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	962.000	<b>REAL PROPERTY</b>	203.000
ADMIN	226.617	* NEW CAPITAL EQUIPMENT	0.150
OTHER	143.587	<b>EQUIPMENT</b>	321.845
<b>TOTAL</b>	<b>1,332.204</b>	* NEW SCIENTIFIC & ENG. EQUIP.	7.915
<b>ACRES</b>	<b>4,000</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Natick Research, Development & Engineering Center**



**Natick Research, Development & Engineering Center**

Natick, MA 01760-5000  
(508) 233-4300

Commander: Colonel Morris E. Price, Jr.  
Acting Tech Dir: Mr. Philip Brandler

**MISSION**

To provide superior products and technologies that protect, sustain, and improve the quality of life for our foremost customers --armed forces men and women-- under extreme environmental and hazardous conditions worldwide.

Natick accomplishes its mission by conducting research, development, testing, evaluation, and engineering of the systems and materiel that support today's warfighters and peacekeepers and will equip them for the future. Natick is also the executive agent for the Department of Defense's food and nutrition research, development, testing, and engineering program.

**CURRENT IMPORTANT PROGRAMS**

1. Maximize the combatant's survivability through development of integrated, modular, components that provide individual protection from ballistic, percutaneous chemical and biological, environmental, flame, surveillance, and directed energy threats.

Two (2) Cooperative Research and Development Agreements (CRADA) support ballistic protection R&D: Fibers for ballistic impact applications; Synthetic polymers that mimic the properties of spider silk. There is a patent license agreement for a cushioning mat for use as portable bedding.

2. Development of technology insertions for a 21st Century integrated, individual, modular fighting system that links the soldier to the digitized command and control network.

3. Provide soldiers with enhanced Quality of Life in the field through the development and fielding of advanced field services equipment. Improvements in field services focus on showers, laundries, and latrine facilities, as well as the integration of heating and cooling into field rest and recuperation facilities, ensuring complete operation in all environmental extremes.



**CURRENT IMPORTANT PROGRAMS (continued)**

4. Develop a family of high performance enhancing combat rations (special purpose and standard Individual/Group) and modularized, rapidly deployable field feeding equipment systems for all the services to support the full spectrum of tactical scenarios.

Several CRADAs support combat rations and field feeding R&D: innovative methods to process meals in microwave pouches; irradiation processes in the preservation of foods; improved capability for preparing special microencapsulated performance-enhancing nutrients; encapsulation systems utilizing lipid vesicle technology; chocolate-based individual ration components; novel edible food; shelf stable, eat-out-of-hand ration components; and candidate replacements for the Flameless Ration Heater.

5. Enhance the mobility of the combatant with the following systems: terrain traversal, personnel augmentation equipment, personnel and cargo airdrop.

6. Protect personnel and equipment systems through the development and fielding of transportable field shelters (both tactical and rigid wall) to house mobile command and control, communications, and field maintenance operations as well as to provide temporary environmental protection for personnel.

**EQUIPMENT/FACILITIES**

Unique facilities at Natick include: man-rated climatic chambers capable of simulating world-wide environmental conditions; the Defense Simulation Internet (DSI) Facility which connects to the worldwide DSI for inserting fully outfitted dismounted infantryment into the world of distributed interactive simulation; the aircraft and airdrop load roller conveyor; static and drop test facilities; the soft shelter prototype fabrication facility which has many unique state of the art tentage fabrication machines and tools including radio frequency fabric welders, hot wedge and hot air seam sealers, and is co-located with the rain test tower; food packaging facilities capable of prototype plant scale operations and simulation of rough handling; food processing pilot plant facilities; the food service equipment, engineering and evaluation lab including hooded work areas for chemical and combustion testing, a machine shop, an energy utilization panel, portable diagnostic and gas measurement instruments, and sound levels equipment; a complete laser laboratory with an alexandrite (variable frequency) laser; a fiber spinning and recycling facility; a dyeing, printing, and finishing fabrics pilot plant; a seams lab; a microbiology lab with a molecular modeling graphics workstation; a biotechnology lab with automated respirator; fermentation facility; a microscopy lab with optical, electron, and atomic force microscopes; a taste test lab; and a terrain analysis system.

Other equipment at Natick includes spectrophotometers; a CCD camera imaging system; robotic chemical agent stimulant test apparatus; Oligonucleotide & peptide synthesizers; peptide sequencers; thermal analysis equipment; chambers for simulating artificial light; multi-layer film extrusion system; ballistics high speed impact test equipment; a materials testing machine (100lb capacity); a computer video-analysis system; three-dimensional head and full body scanners; instrumented manikins; a small flight test/ultralight aircraft; a computerized pattern generating and grading system; a computerized rapid prototype machine; a twin screw extruder; and chromatographers with capabilities including GC, GC/MS, GDC, and HPLC.

## Natick Research, Development &amp; Engineering Center

Natick, MA 01760-5000

(508) 233-4300

Commander: Colonel Morris E. Price, Jr.

Acting Tech Dir: Mr. Philip Brandler

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.354	NA	0.354
6.1 Other	2.175	0.918	3.093
6.2 IED (Navy)	NA	NA	NA
6.2 Other	13.392	14.192	27.584
6.3	3.443	8.135	11.578
<b>Subtotal (S&amp;T)</b>	<b>19.364</b>	<b>23.245</b>	<b>42.609</b>
6.4	3.739	2.468	6.207
6.5	3.696	4.795	8.491
6.6	1.090	1.824	2.914
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>27.889</b>	<b>32.332</b>	<b>60.221</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	6.021	1.736	7.757
Other	0.256	0.335	0.591
<b>TOTAL FUNDING</b>	<b>34.166</b>	<b>34.403</b>	<b>68.569</b>

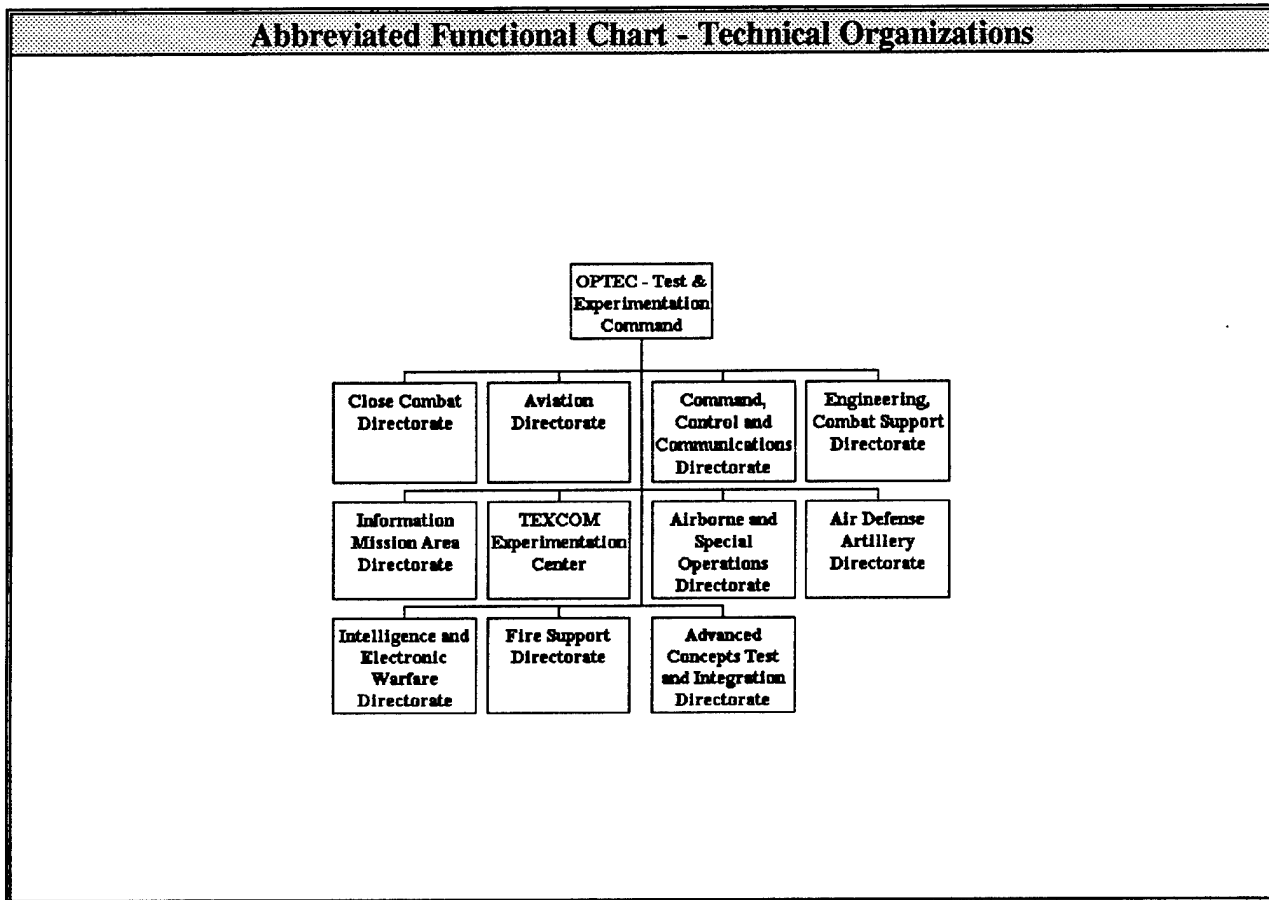
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	30	1	8	21
CIVILIAN	527	52	292	183
<b>TOTAL</b>	<b>557</b>	<b>53</b>	<b>300</b>	<b>204</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	307.462	<b>REAL PROPERTY</b>	40.903
ADMIN	323.528	* NEW CAPITAL EQUIPMENT	2.373
OTHER	300.880	<b>EQUIPMENT</b>	37.791
<b>TOTAL</b>	<b>931.870</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.836
<b>ACRES</b>	<b>174</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

OPTEC-Test and Experimentation Command



**OPTEC-Test and Experimentation Command**

Fort Hood, TX 76544-5065

(817) 288-9114

Commander: BG A. J. Madora

Technical Dir: \*\*\*Under Recruitment\*\*\*

**MISSION**

Support the Army materiel acquisition and force development processes by managing the User Testing Program and conducting operational testing to support force development.

**CURRENT IMPORTANT PROGRAMS**

AGES II	Air-Ground Engagement System for AH-64A
AGS	Armored Gun System
ATTCS	Army Tactical Command and Control System
Breacher	Breacher (Grizzly) Mine Clearing Device
CTASC-II	Corps Theater Automation Service Center II
C2V	Command and Control Vehicle
FMTV III	Family of Medium Tactical Vehicles III
Longbow Apache	Modernized Apache Helicopter
NDI-BIDS	Non-Developmental Item/Biological Integrated Detection System
SAAS-MOD	Standard Army Ammunition System-Modernization
AWE	Advanced Warfighting Experiments: Focused Dispatch and Warrior Focus

**EQUIPMENT/FACILITIES**

Position location, high angle modular integrated target, video, data acquisition and reduction, thermal imaging, fiber optics and video multiplexer/demultiplexer, range timing, microwave, environmental measurement and survey equipment.

## OPTEC-Test and Experimentation Command

Fort Hood, TX 76544-5065

(817) 288-9114

Commander: BG A. J. Madora

Technical Dir: \*\*\*Under Recruitment\*\*\*

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	0.000	0.000	0.000
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	76.071	0.000	76.071
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>76.071</b>	<b>0.000</b>	<b>76.071</b>
Procurement	3.201	0.000	3.201
Operations & Maintenance	50.296	0.000	50.296
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>129.568</b>	<b>0.000</b>	<b>129.568</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

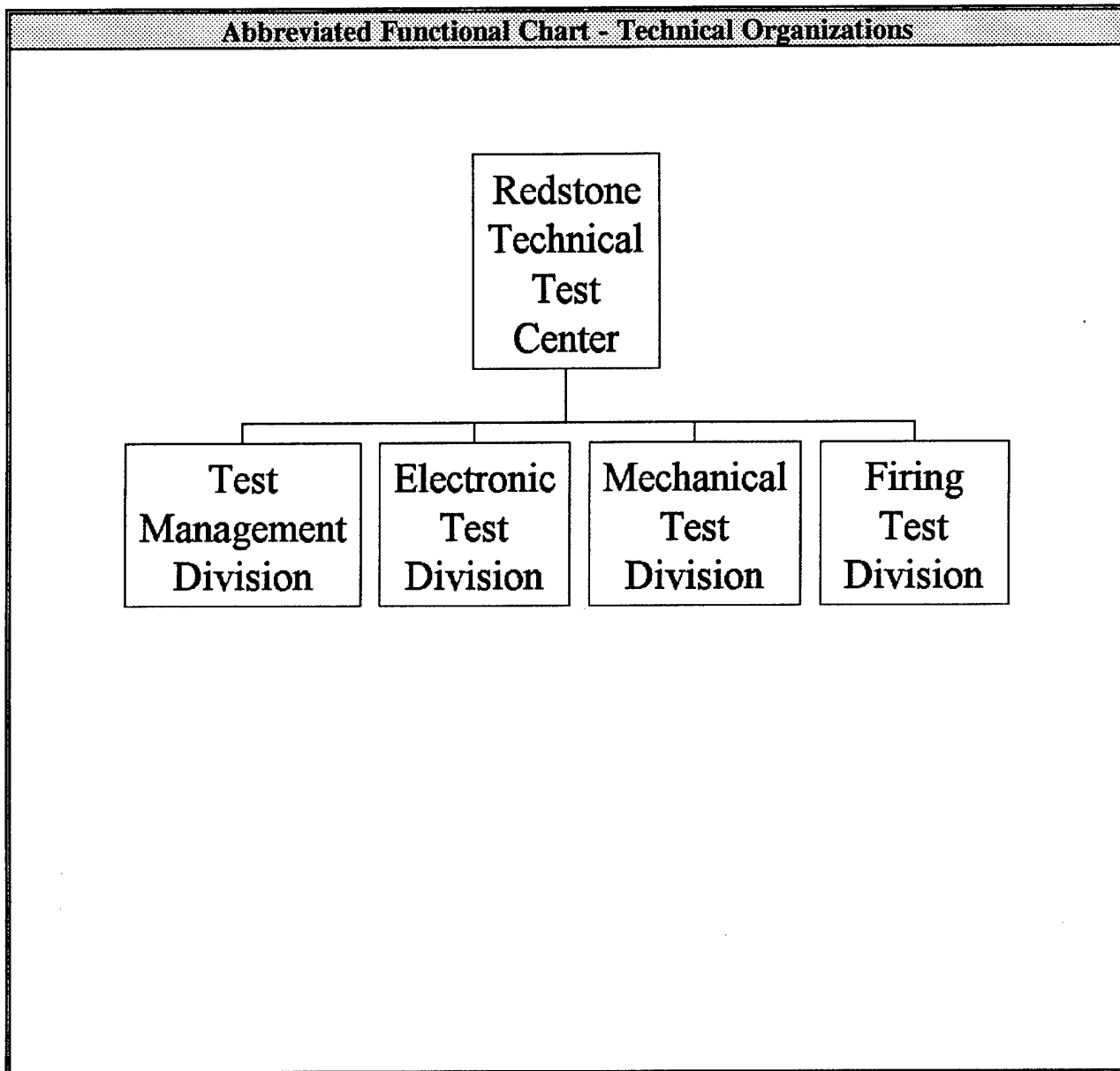
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	677	0	11	58
CIVILIAN	502	2	55	168
<b>TOTAL</b>	<b>1,179</b>	<b>2</b>	<b>66</b>	<b>226</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	19.900	<b>REAL PROPERTY</b>	6.300
ADMIN	41.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	0.000	<b>EQUIPMENT</b>	3.000
<b>TOTAL</b>	<b>60.900</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>22</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Redstone Technical Test Center



**Redstone Technical Test Center**  
Redstone Arsenal, AL 35898-8052  
(205) 876-4482

Director: Larry H. Johnson  
Deputy Director: Carl E. Roberts

### **MISSION**

Plan, conduct, analyze, and report the results of technical tests of subsystems and components of major weapon systems and associated systems/materials; conduct life cycle technical testing of small rockets/guided missiles, and serve as DOD Lightning Test Facility for hazardous items. RTTC provides testing and test support for rocket and missile research, development, test, and evaluation and other missions of authorized customers within the Department of Defense and outside the DOD, to include government and non-government organizations, domestic and foreign.

### **CURRENT IMPORTANT PROGRAMS**

Air-To-Ground Missile System (HELLFIRE)  
Air-To-Ground Missile System (LONGBOW)  
TOW Missile System  
Improved Target Acquisition System (ITAS)  
Improved Bradley Acquisition Subsystem (IBAS)  
Javelin Missile System  
Multiple Launch Rocket System (MLRS)  
ATACMS/BAT  
MPIM SRAW  
MICOM Missile Repair Parts Program  
MICOM Missile Shelf Life/Surveillance Program  
Enhanced Fiber Optic Guided Missile (EFOG-M)  
M72  
Bunker Defeat Munition (BDM)



**EQUIPMENT/FACILITIES**

Extensive equipment/instrumentation for performing complete functional tests in the laboratory and field, of weapon system subsystems and components including IR, millimeter wave, and laser seekers and guidance sections, IR and visual target acquisition systems, antennas, fire control systems, gyroscopes, batteries, electronic and mechanical safe and arm devices, passive components, circuit cards, integrated circuits and other electronic, mechanical, optical, and RF devices. Testing can be accomplished at environmental extremes and test methodology is rapidly expanding to incorporate hardware-in-the-loop (HIL) and state-of-art modeling and simulation (M&S) techniques to project subsystem/component test data to system level performance. Specialized and automated test instrumentation is available/can be developed for particular weapon system application in either a laboratory or remote site environment. Flight test ranges up to 8KM are fully equipped with video and film fixed and tracking cameras, Doppler radars, GPS, telemetry and hard-line instrumentation, and tactical and simulated air and ground targets. A simulation/Test Acceptance facility provides a unique, non-destructive HIL test capability for acceptance testing of all-up-round (AUR) MMW-guided missiles. A 2000 acre, 5KM, laser/optical range for designator/sensor testing has an elevated mound, a 75 ft tower with enclosed 2-story cab, and equipment/instrumentation/aircraft for captive carry and dirty battlefield scenarios. State-of-art instrumentation is available to accurately determine aircraft/target/sensor positions, provide atmospheric transmission measurements, determine target-to-background contrast measurements, and provide target thermal signatures. Development of high resolution, three dimensional, interactive, validated terrain models of RTTC ranges in the visual, infrared, and MMW bandwidths is in progress. Facilities for static and dynamic warhead testing are fully equipped with high speed cameras and flash radiography. Full range of equipment/chambers is available for nondestructive and climatic testing. Static test facilities can accommodate static and liquid rocket motors up to 150K pounds vertical thrust and 10M pounds horizontal thrust. Rocket motor dissection capability exists and a thermal ablative/ducted rocket engine test facility is nearing completion. Dynamic test capabilities include vibration, shock, drop, centrifuge, and rail impact testing. E3 facilities conduct EMRH/EMRO, EMI, antenna and RCS measurements. A radar Environment Emulation System housed in a broadband, 100 DB shielded, anechoic chamber provides capability to test weapon systems to high power, pulse modulated EMR environments.

Redstone Technical Test Center  
 Redstone Arsenal, AL 35898-8052  
 (205) 876-4482

Director: Larry H. Johnson  
 Deputy Director: Carl E. Roberts

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
<b>Subtotal (S&amp;T)</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	27.463	0.000	27.463
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>27.463</b>	<b>0.000</b>	<b>27.463</b>
Procurement	13.516	0.000	13.516
Operations & Maintenance	3.802	0.000	3.802
Other	7.499	0.000	7.499
<b>TOTAL FUNDING</b>	<b>52.280</b>	<b>0.000</b>	<b>52.280</b>

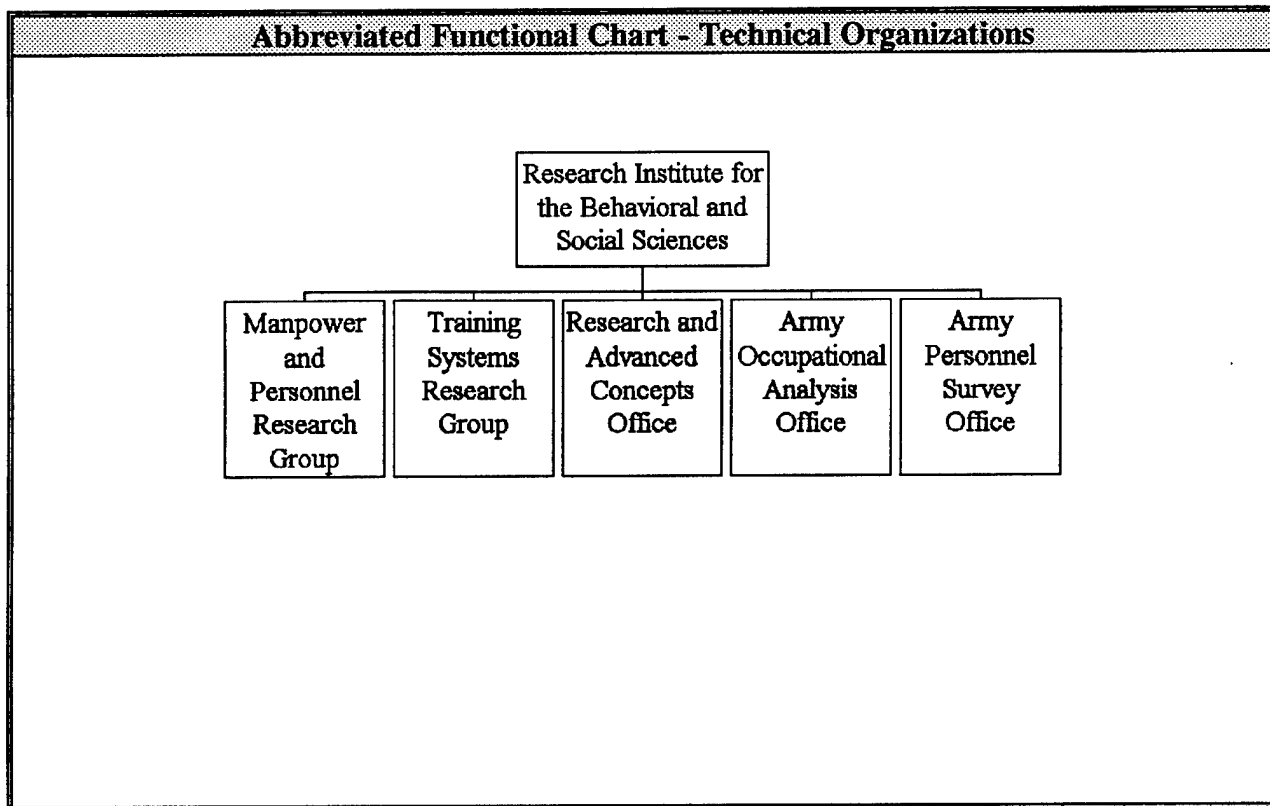
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	0	0	0	0
CIVILIAN	161	1	95	65
<b>TOTAL</b>	<b>161</b>	<b>1</b>	<b>95</b>	<b>65</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	460.000	REAL PROPERTY	146.000
ADMIN	52.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	133.000	EQUIPMENT	0.000
<b>TOTAL</b>	<b>645.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>14,000</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Research Institute for the Behavioral & Social Sciences



**Research Institute for the Behavioral & Social Sciences**  
Alexandria, VA 22333-5600  
(703) 617-8637

Director: Dr. Edgar M. Johnson  
Chief of Staff: COL Larry J. Wagstaff

#### **MISSION**

Maximize individual and unit performance through advances in human resources development in conjunction with effective and affordable training strategies to meet the full range of Army missions. ARI achieves its mission through the activities of its research units located at its headquarters in Alexandria, VA and elsewhere CONUS and OCONUS (see the following list). In all cases ARI is a tenant at these locations where the host activity provides services (e.g., facilities, utilities) for a fee. Research Units: Simulator Systems Research Unit (Orlando, FL); Armored Forces Research Unit (Ft. Knox, KY) and Ft. Irwin NTC Element (Ft. Irwin, CA); Infantry Forces Research Unit (Ft. Benning, GA); Reserve Component Training Research Unit (Boise, ID); Rotary-Wing Aviation Research Unit (Ft. Rucker, AL); Ft. Leavenworth Research Unit (Ft. Leavenworth, KS); Leader Development Research Unit (West Point, NY). Scientific Coordination Offices: Ft. Bragg SCO (Ft. Bragg, NC); USAREUR SCO (Heidelberg, GE); London SCO (London, England) and TRADOC SCO (Ft. Monroe, VA).

#### **CURRENT IMPORTANT PROGRAMS**

1. Battle command leader development
2. Human resources development: recruitment, selection, assessment, promotion and retention
3. Unit training techniques and strategies
4. Rotary wing training
5. Land warfare training

#### **EQUIPMENT/FACILITIES**

In-house experimental facilities include laboratory and computer facilities for real-time, man-in-the-loop experimentation. Unique assets include: combat arms simulators; Virtual Reality test bed for dismounted troops; a helicopter training research facility with a modular, reconfigurable flight simulator; simulators for UH-1FS, AH-64A & UH-60A helicopters; research access to SIMNET (networked simulators for armor); and Battle Command Experimentation Center.

## Research Institute for the Behavioral &amp; Social Sciences

Alexandria, VA 22333-5600

(703) 617-8637

Director: Dr. Edgar M. Johnson

Chief of Staff: COL Larry J. Wagstaff

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.111	NA	0.111
6.1 Other	0.207	2.551	2.758
6.2 IED (Navy)	NA	NA	NA
6.2 Other	6.010	3.976	9.986
6.3	3.904	1.003	4.907
Subtotal (S&T)	10.232	7.530	17.762
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	7.703	2.195	9.898
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	17.935	9.725	27.660
Procurement	0.000	0.000	0.000
Operations & Maintenance	2.260	5.157	7.417
Other	0.000	0.000	0.000
TOTAL FUNDING	20.195	14.882	35.077

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

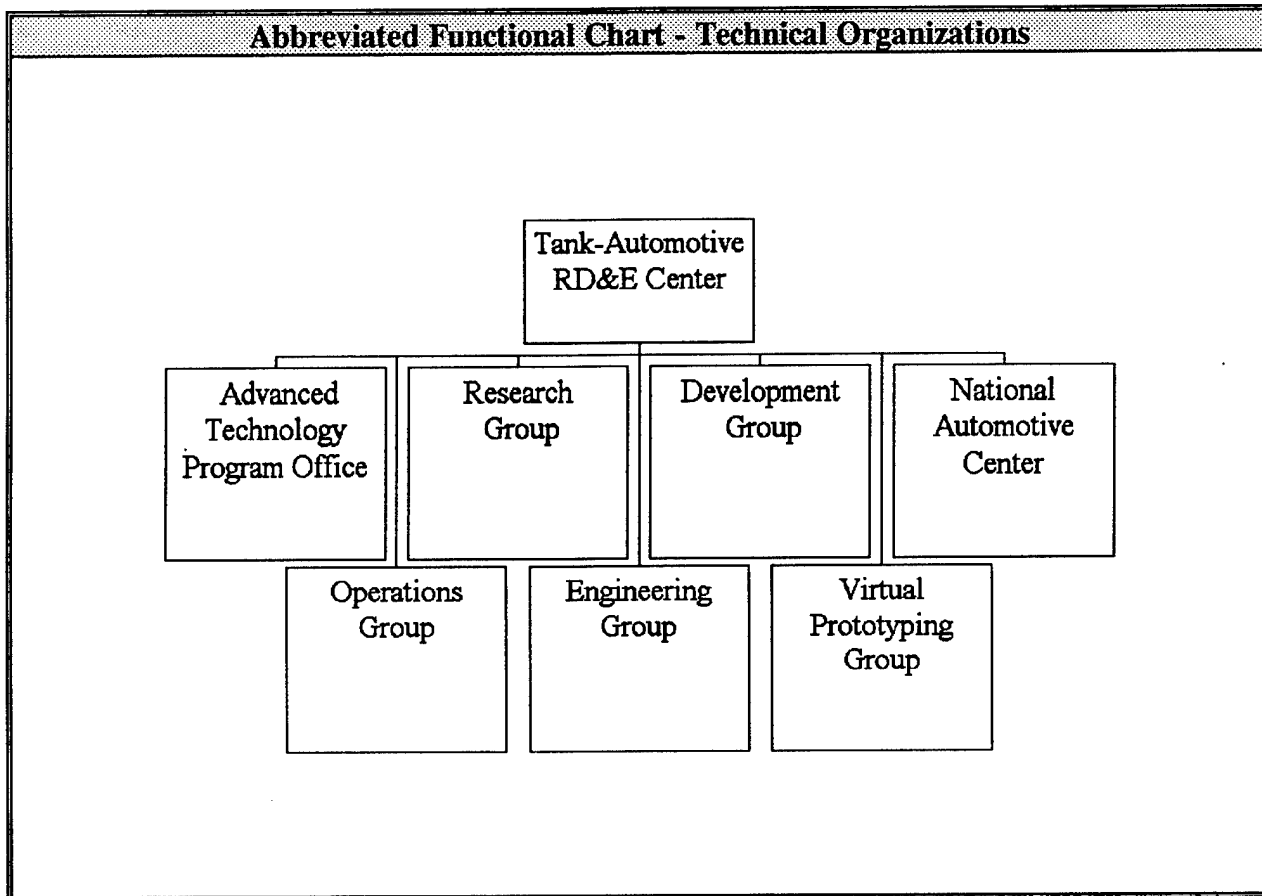
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	9	0	6	3
CIVILIAN	200	97	19	84
TOTAL	209	97	25	87

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	21.500	REAL PROPERTY	17.000
ADMIN	67.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	12.082	EQUIPMENT	19.000
TOTAL	100.582	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Tank-Automotive Research, Development & Engineering Center**



**Tank-Automotive Research, Development & Engineering Center**

Warren, MI 48397-5000  
(810) 574-6265

Dir, RDE Center: Mr. Wayne Wheelock  
Tech Director: Dr. Richard E. McClelland

**MISSION**

To conduct research, development and engineering for global technological superiority in ground vehicles, and to stimulate transition to a growing, integrated, national industrial capability which provides the most advanced, affordable military systems and the most competitive commercial products.

**CURRENT IMPORTANT PROGRAMS**

1. Advanced Technology Demonstrations (ATD's): Composite Armored Vehicle, Crewman's Associate,  
Hit Avoidance.
2. Emerging Systems ie. Future Main Battle Tank, Scout Vehicle.
3. Vehicle Performance Simulation and Virtual Prototyping.
4. Technology Demonstrations to include Advanced Survivability Technologies, Advanced Mobility Systems.
5. Support to PEO's ie. M1A2 SEP, Bradley M2A3, Digitization of the Battlefield, Heavy Dry Support  
Bridge, Tactical Vehicle Mine Protection.
6. Weapon System Management and Configuration Control of 184 Out of Production Vehicle Systems including Data Management and repository for entire DOD Ground Fleet, all DOD Ground Vehicle  
Product Assurance.
7. Technology Transfer Efforts:
  - Demonstration of a large-format holographic computer display system for visualizing vehicle designs and engineering changes.
  - Participation in a joint military/commercial light truck demonstrator program, using advanced commercial technologies.
  - Developing and implementing a comprehensive, integrated virtual prototyping system for ground vehicles, with advanced data exchange and virtual manufacturing support features.
  - Organizing a Land Navigation Conference in April 96 to assist successful mass-market utilization of  
the Global Positioning System by the automobile, transportation and land navigation communities.
  - Organizing an Automotive Supplier Conference to enable small automotive suppliers to better understand the Army ground vehicle fleet.
  - Organizing an automotive Night Driving Conference in June 96 to enhance ground vehicle industry  
access to military night vision technology, improve civilian night driving safety and promote lower  
prices for military night vision equipment.



**EQUIPMENT/FACILITIES**

TARDEC is the only Army/DoD Tank-Automotive Research, Development and Engineering Center committed to overall ground vehicle technology and integration. Unique facilities include:

**VETRONICS SIMULATION LABORATORY** - Battlefield Observation Room, Simulation Control Room, Distributed Simulation Internet Node, Reconfigurable Crew Station, Advanced Electronic Architecture System Integration Lab.

**NATIONAL AUTOMOTIVE CENTER** - A joint venture with the American automotive industry and TARDEC, is leading the way in "dual use" of critical technologies.

**SUPERCOMPUTER** - The Army Regional Supercomputing Facility (ARSF) at TARDEC is one of only three such facilities within the Army. The ARSF provides computational services to TARDEC and defense contractors, supporting activities such as the Heavy Force Modernization Program, and other major Army commands.

**PROPULSION LAB** has six engine and transmission test cells and three vehicle test cells, a chassis dynamometer facility, a truck drive line test cell, brake, tire, heat exchanger, air cleaner, battery testing facilities.

**ARMOR INTEGRATION LAB** performs armor system fabrication and ballistic testing.

**ENVIRONMENTAL TEST CELL** performs high temperature performance tests on vehicles.

**VETRONICS INTEGRATION LAB** utilizes the Standard Army Vetronics Architecture to provide globally shared functions common to vehicle subsystems.

**COMBAT VEHICLE COMMAND AND CONTROL FACILITY** provides an automated command and control system for armor/infantry vehicles, a tactical situation display in all vehicles, and supports the Army Horizontal Technology Insertion Program.

**CREW STATION/TURRET MOTION BASE SIMULATOR** provides vehicle dynamic full-scale simulation.

**BRIDGE TEST FACILITY** - used in testing static or dynamic cyclic loads on various bridge designs.

**WATER QUALITY AND WATER TEST CELL LABORATORIES** - used for the testing of various water filter elements, water filter systems, and provides chemical analytical support to water purification engineer functions.

**FUEL EQUIPMENT TEST LABORATORY** - used for testing and evaluating fuel pumps, fuel filter elements, fuel filter separators, fuel nozzles and engine fuel filter elements.

**EQUIPMENT/FACILITIES (continued)**

**GREASE AND FLUID LABORATORY** provides analytical support required for the qualification, evaluation, and analysis of greases, hydraulic fluids, antifreeze, solid film, and general purpose lubricants.

**FUELS AND LUBRICANTS LABORATORY** provides analytical support required for the analysis of engine oils, gear lubricants, diesel and jet fuel.

**TARDEC FUELS AND LUBRICANTS RESEARCH FACILITY (SWRI)** used to conduct studies of physical properties, performance characteristics, and chemical composition of fuels, lubricants, and other power train fluids.

**TRACK and SUSPENSION LABORATORY** - provides analytical support required for the analysis of vehicle track and suspension designs.

Other facilities and equipment support: software engineering, signature dampening, dynamic motion (seating) simulation, fabrication, computer-aided design, laser spectroscopy, packaging engineering, model shop, metallurgical, mechanical test, animation capabilities used in support of virtual prototyping, rapid prototyping, visualization capabilities, sheet/metal welding, machine shop, assembly shop, electrical, battery test, instrumentation, IR imaging, thermal wave microscopy, applied engineering, robotics engineering, and driving aids.

## Tank-Automotive Research, Development &amp; Engineering Center

Warren, MI 48397-5000

(810) 574-6265

Dir, RDE Center: Mr. Wayne Wheelock

Tech Director: Dr. Richard E. McClelland

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.535	NA	0.535
6.1 Other	0.684	2.577	3.261
6.2 IED (Navy)	NA	NA	NA
6.2 Other	7.143	27.703	34.846
6.3	0.000	60.498	60.498
<b>Subtotal (S&amp;T)</b>	<b>8.362</b>	<b>90.778</b>	<b>99.140</b>
6.4	0.000	17.719	17.719
6.5	0.000	6.449	6.449
6.6	5.027	6.940	11.967
6.7	0.000	0.000	0.000
Non-DOD	11.704	11.577	23.281
<b>TOTAL RDT&amp;E</b>	<b>25.093</b>	<b>133.463</b>	<b>158.556</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	37.676	17.489	55.165
Other	12.498	7.931	20.429
<b>TOTAL FUNDING</b>	<b>75.267</b>	<b>158.883</b>	<b>234.150</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

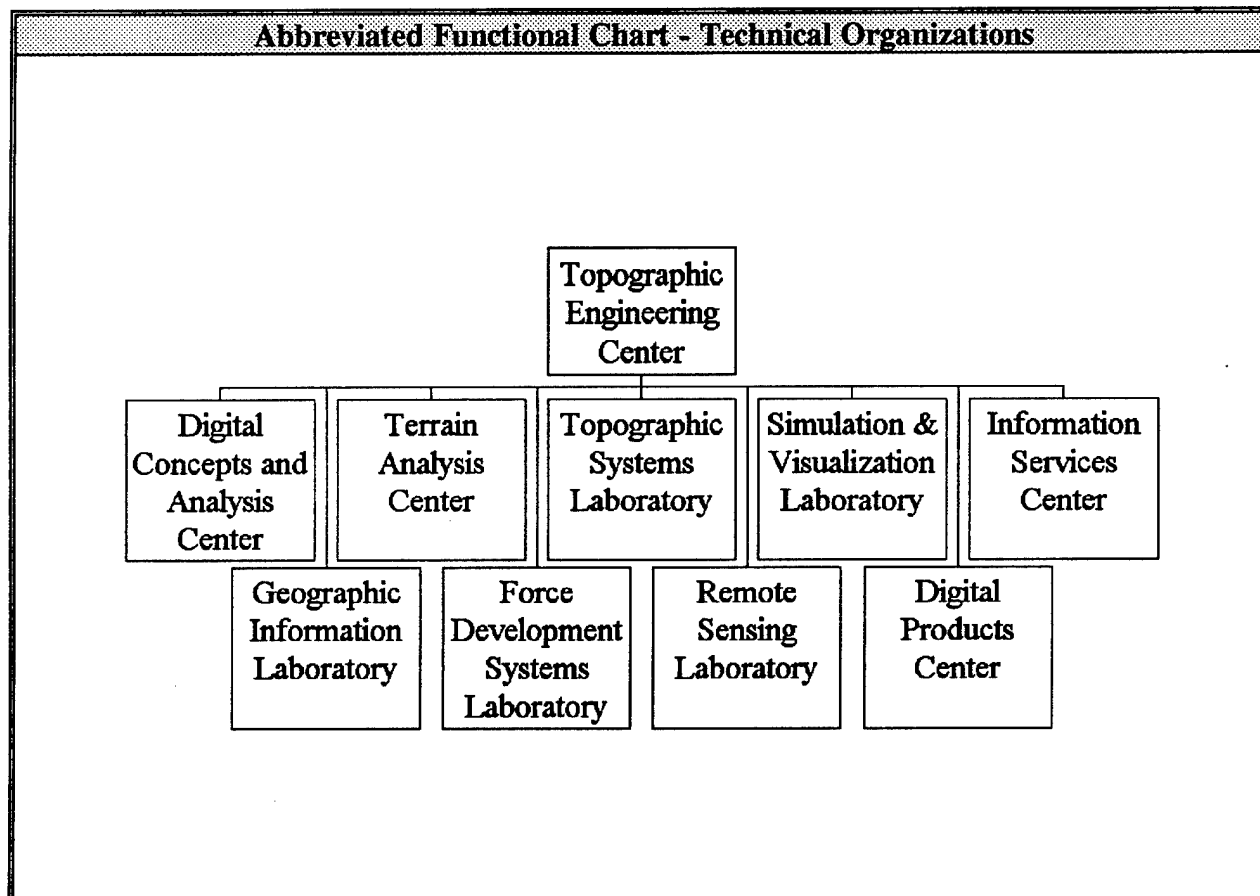
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	19	0	19	0
CIVILIAN	1,304	24	656	624
<b>TOTAL</b>	<b>1,323</b>	<b>24</b>	<b>675</b>	<b>624</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	442.707	<b>REAL PROPERTY</b>	111.660
ADMIN	179.569	* NEW CAPITAL EQUIPMENT	0.950
OTHER	63.665	<b>EQUIPMENT</b>	212.861
<b>TOTAL</b>	<b>685.941</b>	* NEW SCIENTIFIC & ENG. EQUIP.	3.095
<b>ACRES</b>	<b>105</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Topographic Engineering Center**



**Topographic Engineering Center**  
Alexandria, VA 22315-3864  
(703) 428-6654

Director: Walter E. Boge  
Cmdr./Dep.Dir.: COL Richard G. Johnson

### MISSION

The U.S. Army Topographic Engineering Center (TEC) is a field operating activity under the command of the Commanding General, U.S. Army Corps of Engineers (USACE). TEC's mission is to provide the warfighter with superior knowledge of the battlefield and support the nation's civil and environmental initiatives through research, development and the application of expertise in the topographic, environmental and related sciences. This mission involves research and development (R&D), system acquisitions (procurement), and operations and maintenance (O&M) programs. The TEC R&D programs (both military and civil) are under the staff supervision of USACE Director of Research and Development, the acquisition programs are under the staff supervision of PEOC3S/DCSOPS, and the O&M programs are under the staff supervision of the Office of the Chief of Engineers (Pentagon). The Engineer Strategic Studies Center (ESSC), under the operational control of the Deputy Chief of Engineers, serves as the Chief of Engineers' center of creative, innovative analytical thought.

Vision: Inspired people providing new topographic capabilities for America.

### CURRENT IMPORTANT PROGRAMS

Development of the S&T base of capabilities to exploit hyperspectral data derived from remote sensing platforms (data libraries and exploitation hardware); interferometric synthetic aperture radar data for high resolution elevation data and image for feature detection; stereo image exploitation for mapping information to support mission planning, rehearsal and target development; development of digital terrain data standards meeting DoD requirements and needs for operations and simulation; and terrain visualization supporting rapid deployment of contingency forces. S&T support to ARPA in image exploitation, autonomous navigation and computer vision, hyperspectral analysis, and terrain visualization for simulation and warfighting systems. Developmental and demonstration support to PM, Joint Precision Strike, Developmental Support to the Army Space Program Office and the PEO-Command and Control Systems for the Combat Terrain Information System, as well as the US Geological Survey, Central Intelligence Agency, and Central Imagery Office for stereo image exploitation.

**EQUIPMENT/FACILITIES**

Facilities include a computer image generation facility to study and demonstrate computer techniques for 3-D perspective display of topographic information for mission planning, rehearsal and command control; a digital image processing facility with advanced displays and digital image analysis capabilities; an advanced computer vision testbed for generation of image understanding methodology for locating enemy formations; and artificial intelligence testbed for developing automated image analysis and feature extraction techniques; and special measurement equipment permitting the gathering of hyperspectral data elements for advanced imaging systems development. Major computer systems include DECVAX models 780/785, MILVAX II, Connection Machines II and V. Ardent/Stardent, SUN SPARC, and Silicon Graphics Power Vision Indigo.

Topographic Engineering Center  
 Alexandria, VA 22315-3864  
 (703) 428-6654

Director: Walter E. Boge  
 Cmdr./Dep.Dir.: COL Richard G. Johnson

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.185	NA	0.185
6.1 Other	2.240	0.230	2.470
6.2 IED (Navy)	NA	NA	NA
6.2 Other	5.107	4.393	9.500
6.3	0.966	9.811	10.777
<b>Subtotal (S&amp;T)</b>	<b>8.498</b>	<b>14.434</b>	<b>22.932</b>
6.4	0.458	0.570	1.028
6.5	2.040	0.062	2.102
6.6	5.451	1.974	7.425
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>16.447</b>	<b>17.040</b>	<b>33.487</b>
Procurement	1.208	0.033	1.241
Operations & Maintenance	11.526	2.460	13.986
Other	6.799	39.426	46.225
<b>TOTAL FUNDING</b>	<b>35.980</b>	<b>58.959</b>	<b>94.939</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

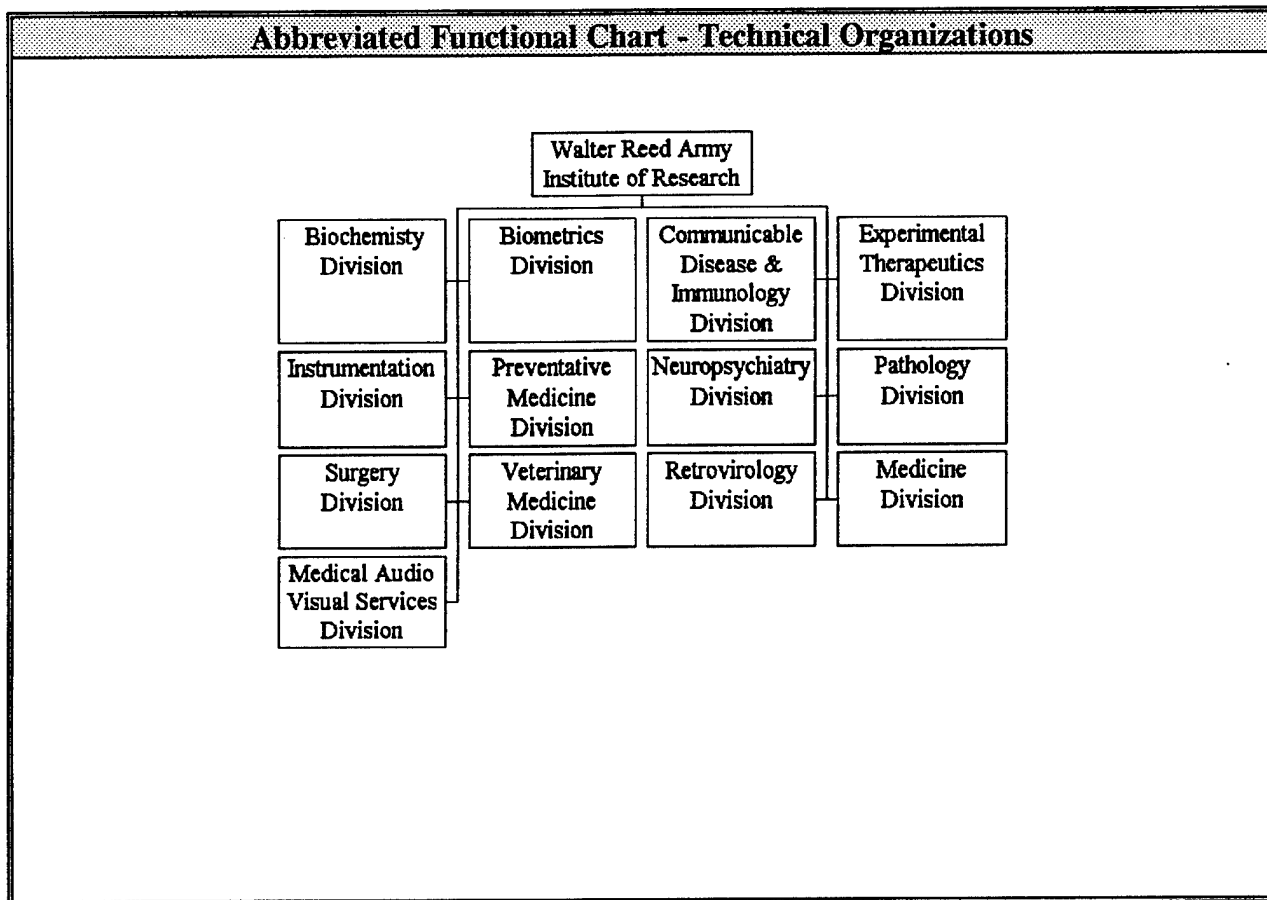
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	11	1	2	8
CIVILIAN	435	13	260	162
<b>TOTAL</b>	<b>446</b>	<b>14</b>	<b>262</b>	<b>170</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	88.776	REAL PROPERTY	22.400
ADMIN	35.081	* NEW CAPITAL EQUIPMENT	0.000
OTHER	53.134	EQUIPMENT	21.423
<b>TOTAL</b>	<b>176.991</b>	* NEW SCIENTIFIC & ENG. EQUIP.	6.820
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable



Walter Reed Army Institute of Research



**Walter Reed Army Institute of Research**  
Washington, DC 20307-5100  
(202) 782-3551

Director: COL Ernest T. Takafuji  
Deputy Director: COL Martin H. Crumrine

### **MISSION**

To conduct quality research in communicable diseases and immunology; drug and vaccine development; combat casualty care; military psychiatry; occupational hazard assessments of weapons systems; chemical and biological defense; military entomology; blood products for the field; and combat dentistry.

To provide to the Army a state-of-the-art research laboratory capability in support of military deployments, disease and health hazard assessments, and the development of new medical products to diagnose, treat, and prevent illnesses in the force.

To provide epidemiological and consultative support in specialized areas of medical research.

To conduct graduate medical education programs, as directed by the Surgeon General of the U.S. Army.

### **CURRENT IMPORTANT PROGRAMS**

Conduct research and develop drugs and vaccines to protect against infectious diseases to deployed soldiers. Conduct research and develop means to prevent operational stress in the combat environment. Conduct research and develop technologies for forward combat casualty care and evacuation. Conduct research and develop strategies and technologies to prevent injuries from blast and directed energy sources and prevent sepsis and shock following traumatic wounds. Conduct research to develop medical strategies for the protection of soldiers from chemical and biological warfare threat. Evaluation of military health hazards of Army weapon systems and manpower programs, in coordination with AMC, TRADOC, and ODCSPER.

### **EQUIPMENT/FACILITIES**

Complete analytical chemistry capability to include gas chromatography and mass spectrometry; drug development from computer-aided drug design and synthesis to field testing for efficacy and safety; vaccine development from basic research and computer assisted recognition of relevant vaccine candidates to animal model development and production, testing and production, testing and licensing; complete infectious disease diagnosis to include isolation and culture of causative agents and serological diagnosis; perform comprehensive human behavioral research studies both in the laboratory setting and in the field; evaluate health hazards from blast, toxic, gas, and laser energy

**EQUIPMENT/FACILITIES (continued)**

as well as materiel, and approaches to combat casualties from these same sources; perform complete epidemiology on military medical threats and accidents from infectious diseases and toxins; through pathological evaluation to include histopathological diagnosis and transmission and scanning electron microscopy studies; basic research studies into the pathophysiology of disease utilizing modern cell physiology and hematological techniques; testing of drugs, vaccines and medical doctrine in overseas locations in Korea, Brazil, Germany, Thailand and Kenya.

**Facility Locations:**

A. WRAMC AND FOREST GLEN - Washington, D.C.

B. CONUS DETACHMENTS  
BAFB, WPAFB, BLOOD, DRD

C. OCONUS SPECIAL FOREIGN ACTIVITIES  
USAMRU-EUROPE  
USAMRU-BRAZIL  
AFRIMS  
USAMRU-KENYA

Walter Reed Army Institute of Research  
 Washington, DC 20307-5100  
 (202) 782-3551

Director: COL Ernest T. Takafuji  
 Deputy Director: COL Martin H. Crumrine

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	2.850	NA	2.850
6.1 Other	12.190	0.679	12.869
6.2 IED (Navy)	NA	NA	NA
6.2 Other	25.364	6.027	31.391
6.3	10.670	0.614	11.284
<b>Subtotal (S&amp;T)</b>	<b>51.074</b>	<b>7.320</b>	<b>58.394</b>
6.4	2.205	0.101	2.306
6.5	1.053	0.128	1.181
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>54.332</b>	<b>7.549</b>	<b>61.881</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	20.274	0.000	20.274
<b>TOTAL FUNDING</b>	<b>74.606</b>	<b>7.549</b>	<b>82.155</b>

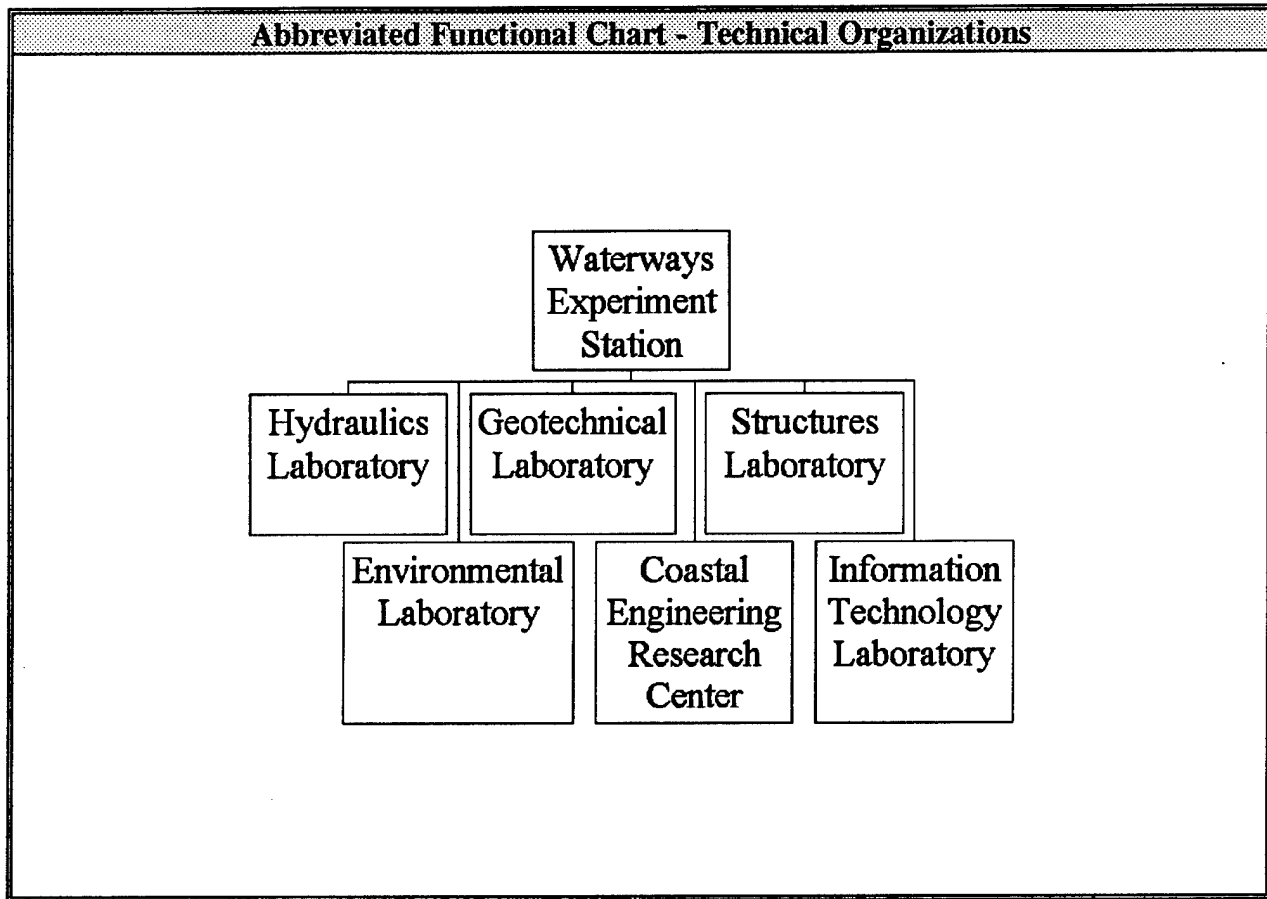
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	465	170	7	288
CIVILIAN	474	98	105	271
<b>TOTAL</b>	<b>939</b>	<b>268</b>	<b>112</b>	<b>559</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	403.544	<b>REAL PROPERTY</b>	16.460
ADMIN	178.372	* NEW CAPITAL EQUIPMENT	0.000
OTHER	151.472	<b>EQUIPMENT</b>	62.353
<b>TOTAL</b>	<b>733.388</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Waterways Experiment Station



**Waterways Experiment Station**  
Vicksburg, MS 39180-6199  
(601) 634-3111

Director: Dr. Robert W. Whalin  
Cmdr & Dpty Dir: COL Bruce K. Howard

### MISSION

The US Army Engineer Waterways Experiment Station (WES) is the largest Civil Engineering/Environmental Quality R&D complex in the Nation and is the Tri-Service Category 3 Reliance lead Laboratory in the Civil Engineering Areas of Airfields and Pavements, Survivability and Protective Structures, and Sustainment Engineering. WES is the Tri-Service Reliance lead Laboratory in the Environmental Quality subarea for Installation Restoration and the executing agency for the Office of the Secretary of Defense Joint Camouflage, Concealment, and Deception (JCCD) Joint Testing and Evaluation Program. WES operates and maintains the first DoD High Performance Computing Major Shared Resource Center for the Director, Defense Research and Engineering. The Tri-Service Computer Aided Design Drafting and Geographic Information System Technology Center is managed, operated and maintained by WES. The Corps of Engineers Central Processing Center is operated and maintained for the purpose of processing management information systems information for about 60% of Corps offices worldwide. WES manages 5 DoD Information Analysis Centers (IAC): Airfields, Pavements, and Mobility (IAC); Coastal Engineering (IAC); Concrete Technology (IAC); Hydraulic Engineering (IAC); and the Soil Mechanics (IAC). WES manages and executes 85% of the Army Corps of Engineer Civil Works Research and Development Program in the areas of hydraulic, coastal, geotechnical, structural, and environmental engineering, and in information technology. Primary research and development missions encompass weapons effects; fighting positions; terrorist threat protection; obstacle creation and reduction; fixed facility camouflage, concealment, and deception; vehicle/terrain interaction; military hydrology; lines of communications, construction, and repair; airfields and pavements; coastal engineering; coastal oceanography; littoral processes; hydraulic engineering; flood control and navigation; dynamic modeling and simulation; environmental impact; groundwater modeling; wetlands processes; environmental site characterization; ecosystem processes; reservoir, riverine, estuarine, and coastal water quality; mobility analyses; seismic response of structures; earthquake engineering; dredging and dredged material disposal; natural resources management; concrete technology; structural dynamics; and geotechnical engineering.

**CURRENT IMPORTANT PROGRAMS**

Unparalleled synergism exists between the \$145M US Army Civil Works Programs (listed as Non-DoD under FUNDING DATA) and the other DoD RDTE Programs. Construction materials and methods for rapid establishment of in-theater transportation network required for force protection; designs, materials, and construction practices for battlefield, fixed facility, and forward base survivability against advanced conventional and terrorist weapons; techniques for rapid obstacle creation; obstacle planning software for inclusion in the Army Tactical Command and Control System; accurate and reliable PC-based mobility models for command and control systems, combat models and simulations, and virtual prototyping; methodologies to predict coastal effects on Logistics-Over-The-Shore operations; Airfields and Pavements research for durable and cost-efficient pavements for roads, airfields, and other operating surfaces; effective remediation of sites contaminated with explosives, organics, and heavy metals; methods for investigation, characterization, and monitoring of potential hazardous waste sites; prediction of subsurface transport of contaminants in subsurface groundwater; effective chemical analysis techniques for accurate identification of suspected contaminants at DoD sites; execution of the DoD Joint Test and Evaluation for Camouflage Concealment, and Deception; National Wetlands Characterization and Restoration; Zebra Mussel research; Repair, Evaluation, Maintenance, and Rehabilitation; Aquatic Plant Control research program; Earthquake Engineering research.

**EQUIPMENT/FACILITIES**

The US Army Engineer Waterways Experiment Station (WES) has an unparalleled combination of experimental and computational facilities for research in hydraulic, geotechnical, structural, environmental, and coastal engineering, and information technology. Some of the more significant facilities are:

Hazardous and Toxic Waste Research Center (HTWRC) (17,000 sq ft): The only DoD-permitted (RCRA) facility to conduct large volume HTW research, development, test, and evaluation. EPA recognizes the HTWRC as the Nation's premier facility.

Fate and Effects R&D Center (30,000 sq ft): Complete experimental radioisotope, microbiology, toxicity, and instrumentation laboratories for contaminant fate and effects on ecosystems.

DoD High Performance Major Shared Computing Center (55,000 sq ft): Includes CRAY C916 and Y-MP systems which provide the most powerful scientific and engineering capability in DoD with 3456 MegaWords of memory, 600 Gigabytes of high-speed disk storage, and 500 Terabytes of high-speed robotic archival storage. Includes a \$4.1M computer graphics laboratory to identify and develop innovative methods of interpreting large data sets from modeling/simulation, field data collection, and Computer Aided Design and Drafting (CADD) applications.

Airfields & Pavements research center (25,000 sq ft): State-of-the-art facility contains the DoD unique Joint Sealant Laboratory and an Automated Data Acquisition System for acquiring rheological data on creep, strength, resilient moduli, and fatigue of a variety of paving materials.

**EQUIPMENT/FACILITIES (continued)**

**Soils Research Center (10,000 sq ft):** The largest soil mechanics research facility in DoD, it has a loading capability of 250,000 lb on triaxial specimens up to 15 in. in diameter.

**Mass Construction Materials Laboratory (20,000 sq ft):** A concrete research and development facility for determining physical, chemical, and mineralogical properties of concrete and other construction materials as well as the structural response of subscale models.

**Full-Scale Aircraft Loading Facility:** Simulates aircraft loading with different wheel loads and gear geometry applied to full-scale constructed test pavements; response and performance data for development of new design models and behavior theories; current fighter and transport aircraft simulators.

**Projectile Penetration Facility:** Unique to DoD, this facility enables investigation of anti-penetration shielding technology techniques employing geologic and manmade structural materials against a wide variety of projectile threats.

**Coastal Facilities:** Approximately 400,000 sq ft under roof for 3-D high-precision coastal experiments. Contains over 850 ft of spectral wave generators (including the 90-ft long Directional Spectral Wave Generator) designed to reproduce waves up to 2 ft in height.

**Field Research Facility, Duck, NC (175 acres):** Recognized worldwide for cooperative field experiments in coastal and nearshore processes; 1,970 ft concrete and steel pier, 1 mile of beachfront, full suite of installed coastal processes instrumentation, special purpose beach and amphibious vehicles, etc.

**Riprap Test Facility:** The largest curved channel test facility of its kind, used for study of effects of curves on velocity of flow, specifically aimed at developing design criteria for riprap protection.

**Mobility Instrumentation Facility:** 30,000 sq ft complex for conducting research and investigations in the areas of cross-country mobility, trafficability, and terrain data acquisition. This research requires complex design and fabrication of real-time data collection and analysis hardware unique to quantifying the performance of all types of wheeled, tracked, and amphibious military vehicles. A 14,000 sq ft annex is optimally structured to support modeling and simulation capabilities in distributive interactive simulations and virtual prototyping in support of battlefield automation.

**Environmental Chemistry Laboratory:** 7,000 sq ft state-of-the-art analytical laboratory supporting the total spectrum of DoD environmental research, development, and technical assistance requirements.

**Aquatic and Wetlands Ecosystem Research Center:** 10,000 sq ft facility provides capability to evaluate the impact of DoD activities on aquatic and wetland ecosystems, including impacts on threatened and endangered species, and wetland identification, delineation, and evaluation.



Waterways Experiment Station  
Vicksburg, MS 39180-6199  
(601) 634-3111

Director: Dr. Robert W. Whalin  
Comm & Dpty Dir: COL Bruce K. Howard

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.242	NA	0.242
6.1 Other	2.209	2.373	4.582
6.2 IED (Navy)	NA	NA	NA
6.2 Other	40.179	53.577	93.756
6.3	9.599	13.248	22.847
Subtotal (S&T)	52.229	69.198	121.427
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	5.186	1.232	6.418
6.7	0.000	0.000	0.000
Non-DOD	104.841	39.978	144.819
TOTAL RDT&E	162.256	110.408	272.664
Procurement	0.835	1.490	2.325
Operations & Maintenance	2.503	0.000	2.503
Other	1.135	0.000	1.135
TOTAL FUNDING	166.729	111.898	278.627

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	1.135

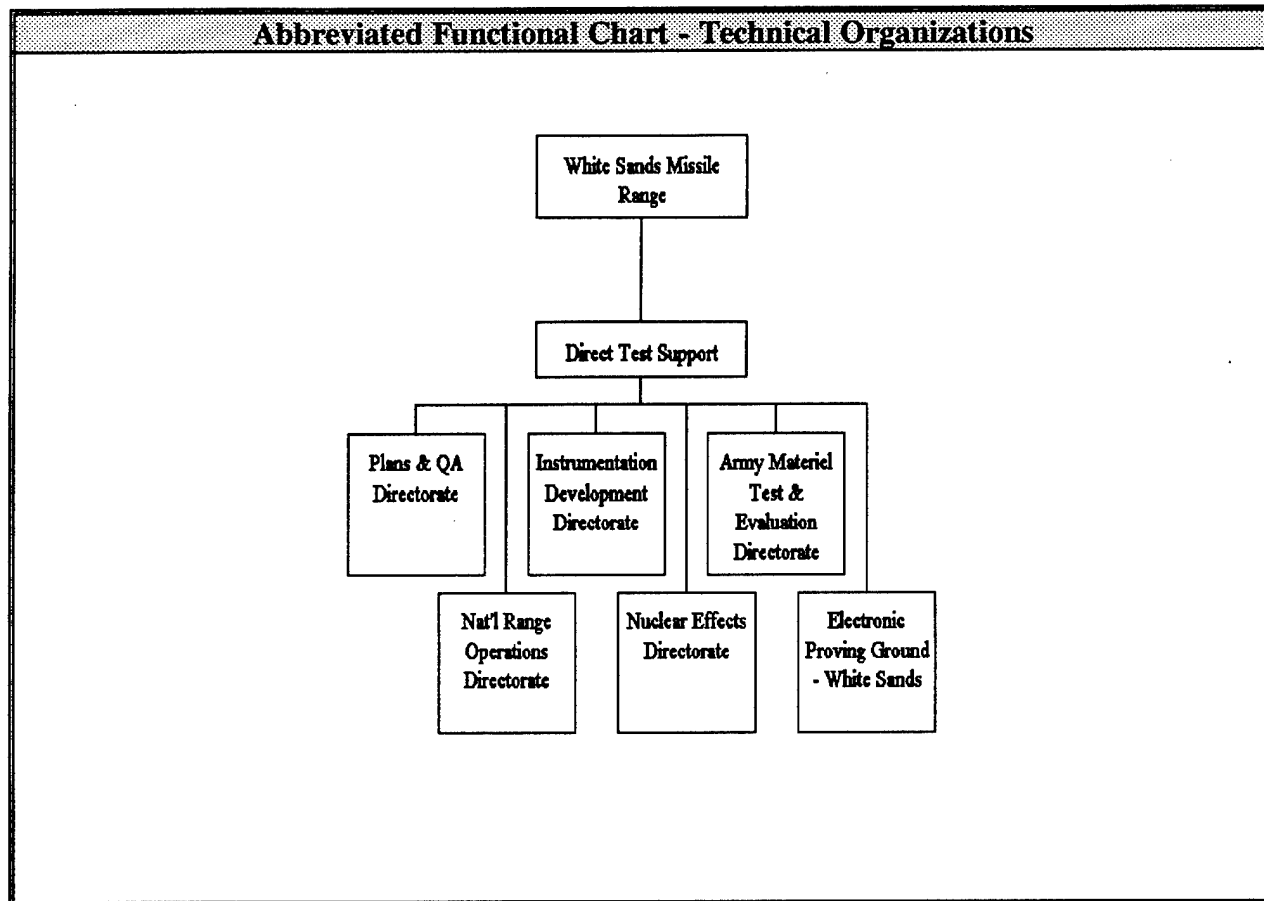
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	6	0	6	0
CIVILIAN	1,399	183	510	706
TOTAL	1,405	183	516	706

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	2,555.940	REAL PROPERTY	482.058
ADMIN	234.240	* NEW CAPITAL EQUIPMENT	1.230
OTHER	63.730	EQUIPMENT	480.828
TOTAL	2,853.910	* NEW SCIENTIFIC & ENG. EQUIP.	13.781
ACRES	2,705	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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White Sands Missile Range



**White Sands Missile Range**

White Sands Missile, NM 88002-5000  
(505) 678-2121

Commander: BG Jerry L. Laws  
Technical Dir.: George A. Orlicki

**MISSION**

WSMR's mission is to provide quality management and operation of the premiere Major Range Test Facility Base (MRTFB) with a unique combination of real estate, airspace, instrumentation, laboratories, launch facilities, and technical expertise, to support the RDTE requirements of the Tri-Services, DoD agencies, other government agencies, commercial entities and foreign governments. WSMR supports the full range of electromagnetic effects and nuclear environments testing. Due to the large land mass and controlled airspace, WSMR supports a variety of combat training activities. To support advanced weapons testing, WSMR is a key resource for development of state-of-the-art instrumentation, not only for WSMR, but for the entire MRTFB community. We challenge, enrich, and develop our most precious asset, our human resources, while continuing to improve productivity and quality of life.

**CURRENT IMPORTANT PROGRAMS**

Army-Patriot, Army Tactical Missile System (ATACMS), High Endoatmospheric Defense Interceptor-Kinetic Interceptor Experiment (HEDI-KITE), Advanced Medium Range Air-to-Air Missile (AMRAAM), Standard Missile (SM), Multiple Launch Rocket System (MLRS), Space Shuttle, Research Rockets and Tactical Training Program.

Unmanned Aerial Vehicle, Army Tactical Command and Control System, Enhanced Position Location Reporting Systems, Global Positioning System, All Sources Analysis System, Single Channel Ground and Airborne Radio Systems, Intel and Electronic Warfare, Counter Technology Assessment Center Support to Office of National Drug Control Policy (Cactus Wren), and Advanced Warfighting Experiments.

**EQUIPMENT/FACILITIES**

White Sands Missile Range, including the Electronic Proving Ground, has a variety of equipment, facilities and features that make it a premier test range. These features include: the largest overland test range, restricted airspace and varied terrain features. WSMR also has range instrumentation which includes the Multiple Object Tracking Radar (MOTR), Remote Control Optical Tracking Mounts, and Telemetry and Radar Instrumentation. WSMR has a complete environmental and scientific laboratory suite (including a Microbiological Test Chamber, Large Environmental Test Chamber, Chemistry Lab, Metallurgy Lab, and Dynamics Lab) and Nuclear Effects testing facilities such as the Solar Furnace, Electromagnetic Pulse, Linear Electron Accelerator, Electro-magnetic Radiation Effects transmitters and Large Blast Thermal Simulator. The Big Crow is an airborne electronic warfare asset that includes an aircraft and helicopters. WSMR is also the site of the Aerial Cable Range, a three mile cable suspended from two mountain peaks. The Smart Munitions Test Suite is a new capability that allows us to track submunitions. At our Electronic Proving Ground site we operate the Electromagnetic Environment Test Facility using computer modeling/simulation, hardware-in-the-loop and controlled field test environment. We also operate the System Interoperability Computer Software Test Facility, the Realistic Battlefield Frequency Measurement Environment Facility, the EMI/EMC/Tempest Transverse Electromagnetic/Reverberation Chamber and the Antenna Test Measurement Facility.

## White Sands Missile Range

White Sands Missile, NM 88002-5000

(505) 678-2121

Commander: BG Jerry L. Laws

Technical Dir.: George A. Orlicki

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.006	0.001	0.007
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.956	0.293	1.249
6.3	2.924	1.443	4.367
Subtotal (S&T)	3.886	1.737	5.623
6.4	5.660	3.282	8.942
6.5	178.647	16.296	194.943
6.6	0.000	0.000	0.000
6.7	0.000	0.011	0.011
Non-DOD	21.583	36.891	58.474
<b>TOTAL RDT&amp;E</b>	<b>209.776</b>	<b>58.217</b>	<b>267.993</b>
Procurement	11.311	7.340	18.651
Operations & Maintenance	5.565	5.483	11.048
Other	5.677	3.394	9.071
<b>TOTAL FUNDING</b>	<b>232.329</b>	<b>74.434</b>	<b>306.763</b>

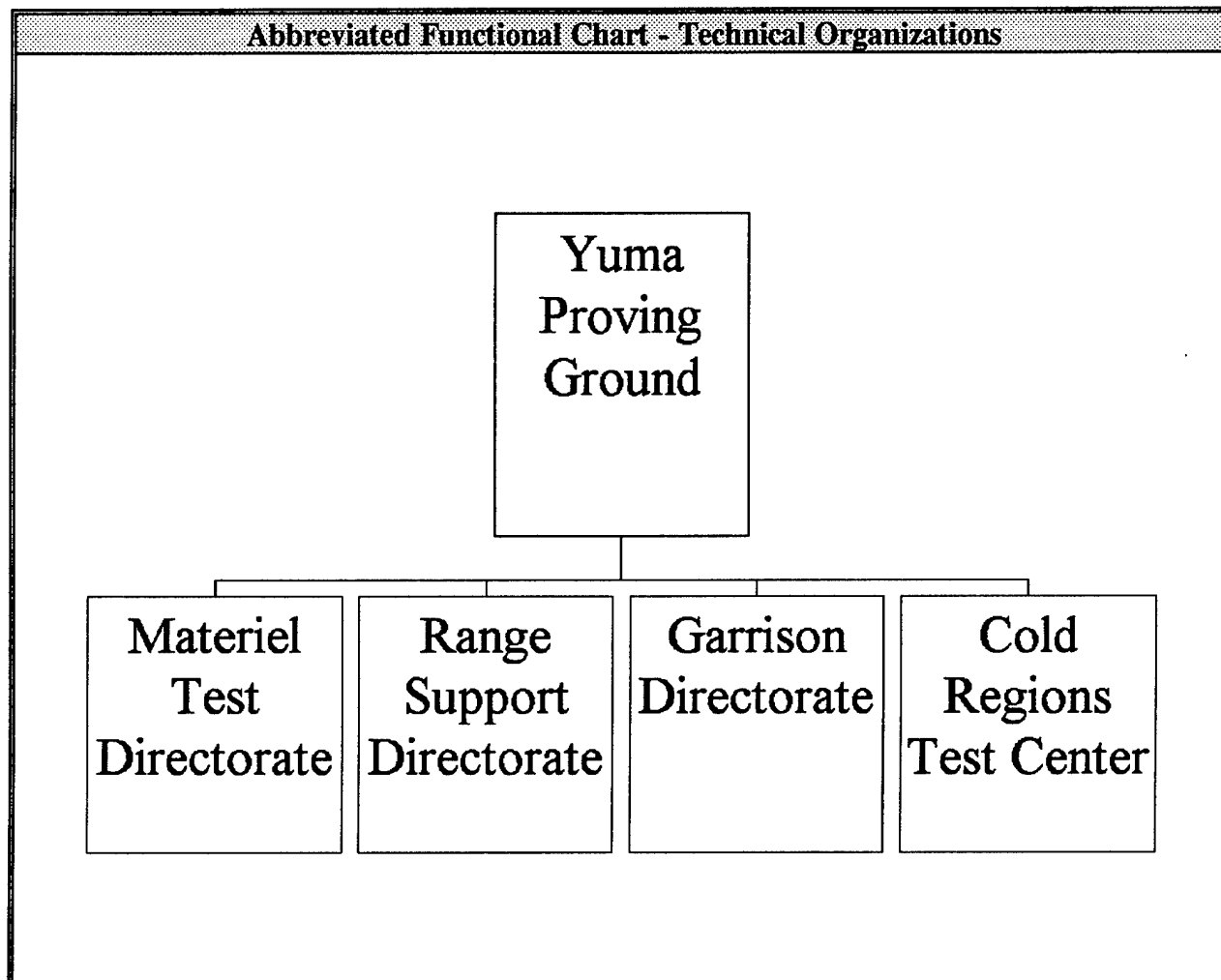
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.001

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	829	1	201	627
CIVILIAN	2,370	12	547	1,811
<b>TOTAL</b>	<b>3,199</b>	<b>13</b>	<b>748</b>	<b>2,438</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	33.868	<b>REAL PROPERTY</b>	439.744
ADMIN	910.674	* NEW CAPITAL EQUIPMENT	18.000
OTHER	643.855	<b>EQUIPMENT</b>	422.000
<b>TOTAL</b>	<b>1,588.397</b>	* NEW SCIENTIFIC & ENG. EQUIP.	48.000
<b>ACRES</b>	<b>2,310,798</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Yuma Proving Ground



**Yuma Proving Ground**

Yuma, AZ 85365-9102

(520) 328-6533

Commander: COL Richard R. Walker

Technical Dir: James L. Wymer

**MISSION**

Plan, conduct, analyze and report the results of developmental testing of aircraft weapons, long-range artillery, military vehicles, armored vehicles, tank weapons, munitions of all types and aerial delivery systems (parachutes). YPG conducts tests of military equipment in the natural desert terrain and environment. YPG also has responsibility for natural environment testing at the Cold Regions Test Center (Alaska) and Tropic Test Site (Panama).

**CURRENT IMPORTANT PROGRAMS**

M1-A1 Abrams Tank  
M-2 Bradley IFV  
Palletized Load System (PLS)  
Sense and Destroy Armor (SADARM)  
Tank Main Armament System (TMAS)  
Liquid Propellant Gun  
C-17 Cargo Aircraft  
Low Altitude Retrorocket Recovery System (LARRS)  
OH-58D Kiowa Warrior  
Unmanned Aerial Vehicle Close Range (UAV-CR)  
RAH-66 Comanche Target Acquisition Systems  
AH-64D Apache Longbow  
Wide Area Mine (WAM)  
SafeAir  
Cold Weather Clothing and Equipment



**EQUIPMENT/FACILITIES**

**WEAPONS FIRING CHAMBER:** Capable of testing full-sized combat/tactical vehicles and helicopter, artillery and direct fire systems from -65°F to 160°F with humidity from 5% to 95%.

**WEAPONS ACCURACY RANGE:** The artillery range is sufficiently large to fire all artillery to maximum range and is fully instrumented with radar, multi-camera tracking mounts, telemetry and microwave systems, specially developed instrumented impact fields and communication systems. The aircraft weapons range is specially developed for helicopter armament and instrumented with multiple laser trackers, radars, telemetry video, multi-camera tracking mounts, remote control moving targets, GPS-based moving target tracking system and integrated real-time mission control and data processing center. The aircraft range includes specialty sites for ground mounted tests of aircraft weapons. All range areas are under restricted airspace to a minimum of 80,000 ft.

**AUTOMOTIVE TEST COURSES:** Paved, unpaved, hilly, Middle East, gravel, dust, fording basin, vehicle swimming, dynamometer capability for all Army systems. Complete shop and overhaul capability for Army vehicles and weapons systems.

**AIR CARGO TEST FACILITY:** Army airfield, two (2) runways to 6000 ft., two (2) hangars, Air Cargo Complex for test of airdrop systems and airdrop qualification of military systems and ammunition.

**TEST ENVIRONMENT:** Complete environment test capability including 30,000 lb. vibration tables, rain, humidity, dust and other chambers. Laboratory facilities including X-ray, chemical and materials lab.

**NATURAL ENVIRONMENT:** Cold weather, tropic and desert testing.

**Yuma Proving Ground**  
 Yuma, AZ 85365-9102  
 (520) 328-6533

Commander: COL Richard R. Walker  
 Technical Dir: James L. Wymer

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	41.755	52.092	93.847
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>41.755</b>	<b>52.092</b>	<b>93.847</b>
Procurement	1.737	3.941	5.678
Operations & Maintenance	12.292	4.482	16.774
Other	19.298	7.528	26.826
<b>TOTAL FUNDING</b>	<b>75.082</b>	<b>68.043</b>	<b>143.125</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	227	0	0	227
CIVILIAN	760	0	113	647
<b>TOTAL</b>	<b>987</b>	<b>0</b>	<b>113</b>	<b>874</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	18.200	<b>REAL PROPERTY</b>	112.600
ADMIN	153.300	* NEW CAPITAL EQUIPMENT	3.651
OTHER	1,855.500	<b>EQUIPMENT</b>	234.618
<b>TOTAL</b>	<b>2,027.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.846
<b>ACRES</b>	<b>1,009,352</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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# **DEPARTMENT OF THE NAVY**

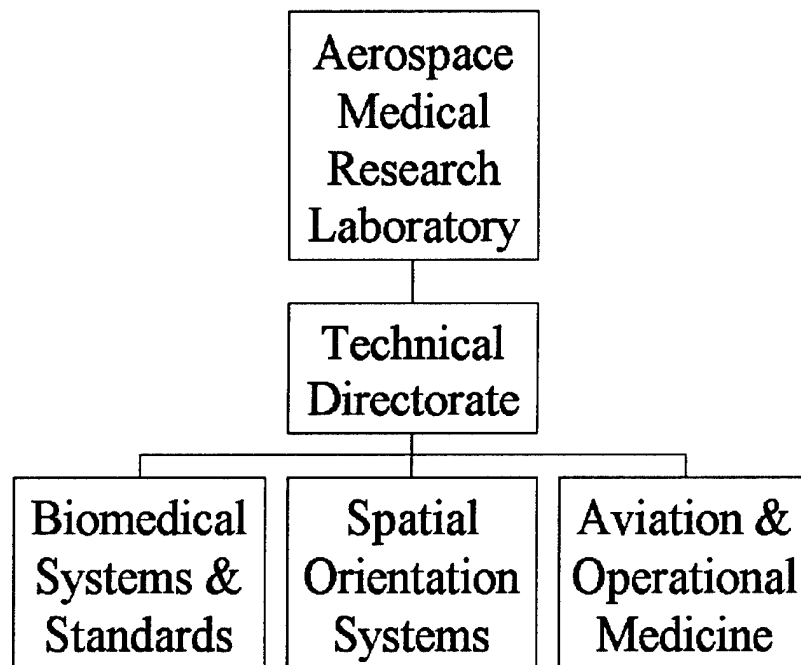
## DEPARTMENT OF THE NAVY

The Navy's sixteen (16) In-House RDT&E Activities are:

Naval Aerospace Medical Research Laboratory .....	3-2
Naval Air Warfare Center .....	3-8
Naval Biodynamics Laboratory .....	3-16
Navy Clothing and Textile Research Facility .....	3-20
Naval Command, Control and Ocean Surveillance Center .....	3-24
Naval Dental Research Institute .....	3-28
Naval Facilities Engineering Services Center .....	3-32
Naval Health Research Center .....	3-36
Naval Medical Research Institute .....	3-40
Naval Medical Research Unit #2 .....	3-46
Naval Medical Research Unit #3 .....	3-50
Navy Personnel Research and Development Center .....	3-56
Naval Research Laboratory .....	3-62
Naval Submarine Medical Research Laboratory .....	3-68
Naval Surface Warfare Center .....	3-72
Naval Undersea Warfare Center .....	3-78

Naval Aerospace Medical Research Laboratory

Abbreviated Functional Chart - Technical Organizations



**Naval Aerospace Medical Research Laboratory**

Pensacola, FL 32508-1046

(904) 452-3287

CO: Captain J.C. Patee, MSC

Chief Scientist: Dr. R. Stanny

**MISSION**

Conduct RDT&E in aviation medicine and the allied sciences to enhance the health, safety, readiness and physical tolerances of Navy and Marine Corps personnel in the effective performance of contingency and peacetime missions, as well as to perform such other functions or tasks as may be required by higher authority.

**CURRENT IMPORTANT PROGRAMS**

Vestibular Transduction, Motion Perception and Motion Sickness; Performance Based Medical Standards for Naval Aviation; Vision Standards; Night Vision Devices (NVDs); Development of a new generation of night vision devices based in digital enhancement of infrared and standard NVD images; Development of Hearing Protection Devices; Auditory Standards; Vibrotactile stimulation for maintaining spatial orientation.

**EQUIPMENT/FACILITIES**

The VISION LABORATORY includes a mobile night vision device (NVD) training facility ("NITE Lab") that can be used to train NVD users in the field. The "NITE Lab" is equipped with numerous NVD demonstrations and training aids as well as optical testing and vision equipment. The laboratory has facilities for recording, digitizing, and mathematically filtering and enhancing visual images. In cooperation with the helicopter training facility at Whiting Field (TRAWING FIVE), the laboratory is able to non-invasively record the instrument scan patterns of pilots flying the motion-based, full-scale helicopter instrument trainer.

The PSYCHOACOUSTICS LABORATORY includes acoustical test chambers, a Real-Ear Attenuation Test Facility (ANSI standard compliant), a semi-reverberant test chamber for simulating various Navy operational environments, and a high-level noise test chamber. In addition, equipment supporting analog and digital signal processing, speech analysis, spectral analysis, and radio voice communications monitoring is resident. The laboratory also houses unique equipment to design, fabricate, and test innovative hearing protective ear cups.

The SPATIAL DISORIENTATION LABORATORY capability is a unique national asset consisting of many one-of-a-kind research devices. The CORIOLIS ACCELERATION PLATFORM (CAP) is the only device worldwide capable of applying combined linear and angular acceleration to the human subject. It is also the only device in the DOD inventory available to study chronic exposure to altered

**EQUIPMENT/FACILITIES**

G environments. The CAP utilizes two independently controlled power servomechanism drive systems to generate acceleration stimuli caused by rotation about an Earth-vertical axis and/or rectilinear translation along an Earth-horizontal axis. This device has enabled scientists to make accurate simulations of many bizarre combinations of force stimuli and their effects on aerospace crewmen under carefully controlled conditions. Data gathered by various studies utilizing the CAP continue to contribute significantly to the success of the space program and to the safety and well-being of the astronauts.

The PENDULAR INERTIAL GRAVITATIONAL (PIG) devices (PIG 1A and PIG 1B) are fixed on the CAP linear track and are used to position a human subject at various angles off from vertical z-axis while the CAP room is rotated. The PIGs can be oriented in four different directions.

The Vertifuge or DYNAMIC SIMULATOR (DYNASIM) was installed for research on spatial awareness. This device consists of three main components: A motion system, a visual surround for presentation of Earth-fixed or moving targets, and a computer-controlled system. The Vertifuge is currently being used to study pilot disorientation which has been the direct cause of numerous accidents resulting in loss of life and hundreds of millions of dollars worth of aircraft.

The EQUITEST SYSTEM employs computerized dynamic posturography to systematically examine the effectiveness of visual, vestibular, and somatosensory inputs to balance and the timing, strength, and coordination of postural movements. This allows for evaluation of visual, vestibular, and somatosensory contributions to equilibrium.

The PATE DEVICE resembles a patient litter and is capable of rotating a subject about the longitudinal body axis and/or the horizontal axis through the pelvis. This apparatus has slip rings which permit physiological monitoring, and is currently being used to study eye movement in response to rotation or perceived motion generated by moving patterns projected on a hemispheric screen in front of the subject.

The HUMAN DISORIENTATION DEVICE (HDD) is capable of accelerating an instrumented human subject about two head-centered axes simultaneously to help differentiate the relative roles played by the various sensory systems involved in the production of disorientation as well as to examine the contribution of each system and subsystem to motion sickness. The HDD is another instrument employed for studying the effects of disorientation caused by rotation and tumbling. The HDD differs substantially from the Pate device in that the axes of rotation can be made to pass through the intersection of the interaural and naso-occipital lines. It permits isolation and stimulation of specific portions of the organs of balance in the middle ear. This device has provided direct support for many basic and applied research projects sponsored by both the Navy and NASA.

The OCULAR COUNTERROLL DEVICE is used to measure ocular counterroll in response to total body tilting movement and provide information on possible changes related to aging.

The OFF-VERTICAL-ROTATOR (OVR) is used to gain measures of semicircular canal and otolith function and related spatial orientation performance. The PERIODIC ANGULAR ROTATOR (PAR) is a novel servomotor designed for studies of the dynamic response of the vestibulo-ocular system. The PAR is a high-performance motion-inducing instrument that rotates a seated subject about the Earth-vertical axis in a wide variety of stimulus waveforms.



**EQUIPMENT/FACILITIES**

We have three ENVIRONMENTAL CHAMBERS. Two are in adjacent rooms. One of which is 8x8 ft. and the other is 10 x 16 ft. The smaller room is primarily used for cold exposure with active temperature control from -5 to 25 C, and the larger room has active temperature control from 0 to 50 C. The third environmental chamber is a free-standing 8 x 10 ft. room with precise temperature (0-60 C) and humidity (20-80%) control.

This command has developed several MOBILE FIELD LABORATORIES to conduct specialized clinical and research tests evaluating the visual, vestibular, and auditory sensory systems. These tests, by virtue of the trailer's mobility, permit our researchers to collect data at training bases, in USMC operational settings and on ships.

Naval Aerospace Medical Research Laboratory  
 Pensacola, FL 32508-1046  
 (904) 452-3287

CO: Captain J.C. Patee, MSC  
 Chief Scientist: Dr. R. Stanny

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	1.038	0.165	1.203
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.936	0.059	0.995
6.3	1.534	0.108	1.642
Subtotal (S&T)	3.508	0.332	3.840
6.4	0.400	0.000	0.400
6.5	0.422	0.000	0.422
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	2.434	0.000	2.434
TOTAL RDT&E	6.764	0.332	7.096
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.000	0.000
TOTAL FUNDING	6.764	0.332	7.096

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	25	10	4	11
CIVILIAN	40	5	5	30
TOTAL	65	15	9	41

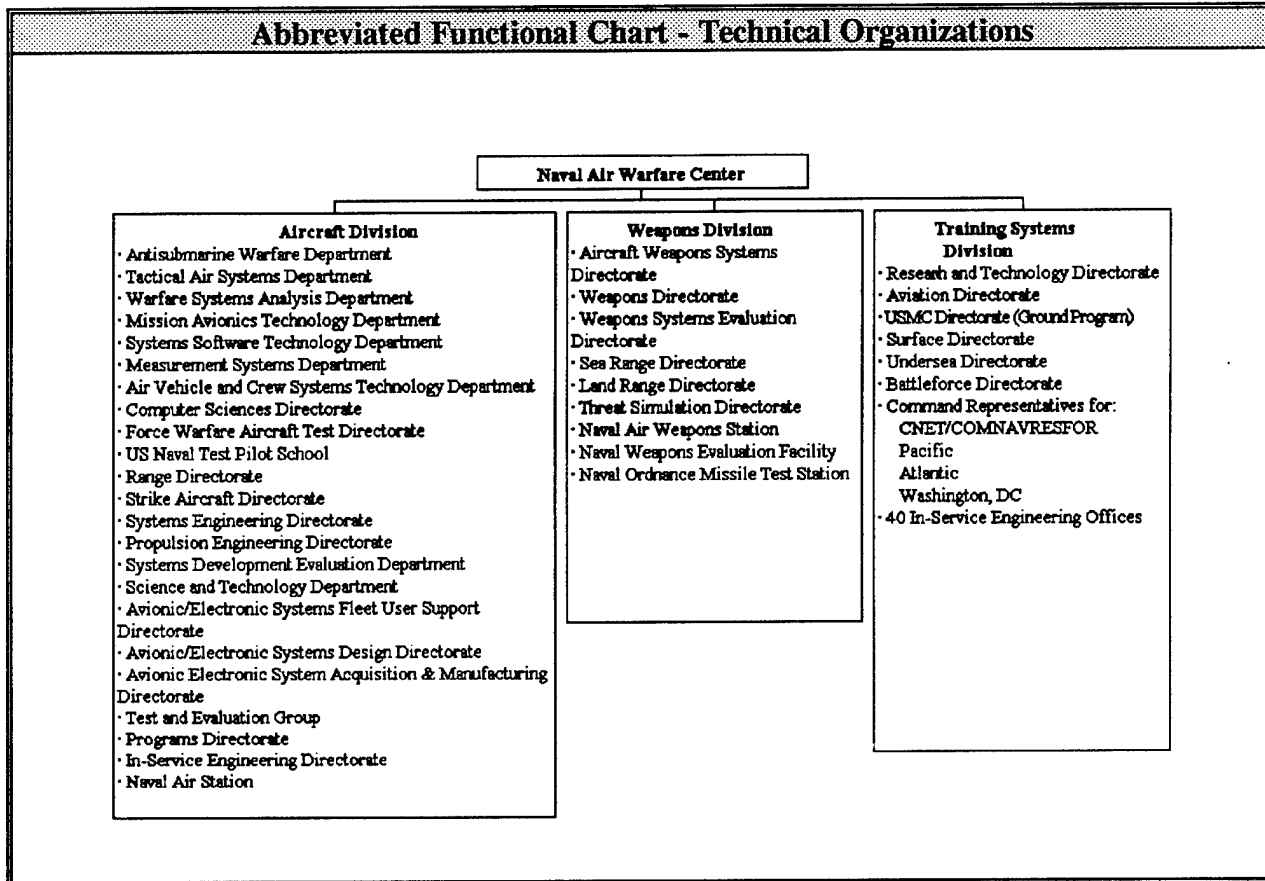
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	102.936	REAL PROPERTY	12.838
ADMIN	6.648	* NEW CAPITAL EQUIPMENT	0.200
OTHER	10.237	EQUIPMENT	10.772
TOTAL	119.821	* NEW SCIENTIFIC & ENG. EQUIP.	0.568
ACRES	3	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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## Naval Air Warfare Center

## Abbreviated Functional Chart - Technical Organizations



**Naval Air Warfare Center**  
Arlington, VA 22243  
(703) 604-6033

**Commander: RADM W. E. Newman**  
**Technical Dir.: Lewis Lundberg**

### **MISSION**

Our mission is to be the Navy's full spectrum research, development, test and evaluation, engineering, and fleet support center for air platforms, autonomous air vehicles, missiles, weapons and sensors used to conduct air warfare; and to be the principal Navy center for acquisition and product support of training systems.

### **CURRENT IMPORTANT PROGRAMS**

#### **ANTI-AIR MISSILES:**

Sidewinder, Sparrow, Phoenix, AMRAAM, Standard Missile.

#### **ANTI-SURFACE WEAPONS:**

High Speed Anti-Radar (HARM) Missile, Tomahawk, Skipper, Harpoon/SLAM, Joint Standoff Weapon (JSOW), Advance Rocket System (ARS), Joint Direct Attack Munitions (JDAM), Harpoon, Hellfire, Cruise Missile.

#### **ELECTRONIC WARFARE:**

Low Cost Seeker (LCS), Electronic Radiation Source Elimination (ERASE), EA-6B System, Radar Warning Receivers, TACAIR EW Electro-Optics and Infrared R&D.

#### **AIRCRAFT SYSTEMS & TACTICAL AIRCRAFT SYSTEMS:**

A-6, EA-6B, AV-8B, F/A-18, F/A-18EF, F-14, AH-1, H-60, V-22, E-2C, T-45TS, ES-3A, EA-6A, KC-130, H-53, JAST, T800 (LNX) Engine Qualification Program, Unmanned Air Vehicle, Aircraft Materials, Crew Systems, Joint Tactical Information Distribution System (JTIDS), Airborne ASW Surveillance, Airborne Surveillance Systems.

#### **TECHNOLOGY BASE:**

Sensors/seekers (AIR, EO, RF) propulsion, warheads, guidance, fuzing, materials technology for weapons system development, Air-Combat Environment T&E Facility (ACETEF), IHPTET Program Management, Weapons and Aircraft Modeling and Analysis.

#### **WEAPONS DIVISION**

##### **Weapons Systems Test and Evaluation:**

AARAM, HARPOON, Improved Tactical Air-Launch Decoy (ITALD), JSOW, SLAM, SPARROW, Standard Missile, Tomahawk

##### **Weapons System Integration:**

A-6 Aircraft, AH-1W Aircraft, F-14, F/A-18 Aircraft, Advanced Forward Looking Infrared (F/A-18),

**CURRENT IMPORTANT PROGRAMS**

Nuclear Safety Programs, Global Positioning System (EA-6B)

**Weapons Systems:**

Evolved Sea Sparrow (ESSM), Gator, HARM, HARPOON, HELLFIRE, JDAM, Phoenix, Rolling Airframe Missile (RAM), Sidewinder, Tomahawk, Penguin.

**Electronic Warfare and Information Warfare Systems:**

AN/AAR-47 Warning System, AN/ALE-29, 39, 47 and 50 Countermeasures System, AN/ALR-66 Warning System, Weapons support systems, Crew systems, materials research and Targets.

**OTHER**

Aircraft Launch and Recovery Systems; Electronics Manufacturing Production Support Vessel Tracking System, Propulsion/materials exploratory and advanced development product support, Targets and simulators for air-launched systems, Threat simulator development; Operation of land and sea ranges.

**TRAINING SYSTEMS DIVISION**

**Research and Technology:**

Instructional Technology, Simulator Networking, Tactical Decision Making Under Stress, Embedded Training Technology, Deployable Training, Virtual Environmental Training, Sensor Simulation, Weapons Teams Simulation, Scenario Development, Simulator Sickness, Aircrew Coordination, Software Technology for Adaptable Reliable Systems, SBIR, Technology Transfer, and Distributed/Joint Training.

**MARINE CORPS GROUND PROGRAMS**

Advanced Assault, Amphibious Vehicle, Multiple Integrated Laser Engagement System, Team Target Engagement System, Combined Arms Staff Trainer, Deployable Forward Observed/Modular Universal Laser Engagement System, Light Armored Vehicle (Air Defense, Anti-Tank, Anti-Ground), Contractor Operations and Maintenance of Simulators (COMS), Full Crew Tank Interactive Simulation (M-60), Egyptian Full Crew Interactive Simulation Training (M1A1), Universal Maintenance Training Systems.

**AVIATION**

EA-6B, F-14, A-6, S-3, E-2C, P-3, SH-2&3, SH-60B/F, T-45, T-34/44, TA-4/T-2, UNFO, JPATS, LSO, ATC, AV-8B, KC-130, V-22, AH-1W, CH-46, CH-53, UH-1N, COMS, F/A-18, A-school, HH-65, HH-60J, Naval Aviation Survival Training Program, Joint Aviation Strike Technology, Joint Acquisition Management System.

**SURFACE**

Close in Weapons Systems, Naval gunfire System, Bridge/CIC Pierside, Forward Observer, ASW Team Training, Propulsion, Fire-Fighting, Buoy Tender (Coast Guard), Landing Craft Air Cushion, Seal Delivery Vehicle Trainer, Rapid Anti-ship Missile Integrated Defense System, On-Scene Coordinator, COMS, Propulsion, Battle Force Team Training, Tactical Advanced Direction System and Electronic Warfare.

**CURRENT IMPORTANT PROGRAMS****UNDERSEA**

Seawolf, Trident, New SSN, Damage Control, Integrated Undersea Surveillance System, SSN 688, Ship Control Systems, Navigation Piloting, SSN Torpedo Room Trainer, Authoring of Instructional Materials, COMS, Submarine Battle Force Team Training, Sub-employment, Training Technology.

**BATTLEFORCE**

E-3/E-6A, Joint Tactical Combat Training System, EP-3/ES-3, "What If..." Simulation System for Advanced Research, I-school, Unmanned Aerial Vehicle, Distributed Interactive Simulation Network Interface Unit, Command and Control Processor, EW, Threat/Intelligence Data Extraction Systems (TIDES), Cryptologic Trainers, COMS, Modeling and Simulation, Office of Training Technology, Command Acoustic Database, Atlantic Undersea Test and Evaluation Center, Mobile Inshore Undersea Warfare.

**EQUIPMENT/FACILITIES****China Lake, CA:**

**ENCOUNTER SIMULATION LABORATORY (ESL):** The ESL is used by the Navy, Air Force, and Army for realistic fuze-target encounter simulations with sub-scale models and full-scale targets using actual or model sensor hardware.

**EXPLOSIVES & PROPULSION LABORATORIES:** A complex of laboratories provides facilities for research in the fundamentals of propellant and explosives technology.

**FULL-SCALE SURVIVABILITY & VULNERABILITY FACILITY:** This facility provides the capability to test and evaluate the vulnerability and lethality of air systems through full-scale, live-fire testing and computer simulations.

**FUZE AND SENSORS LAB:** Provides consolidated engineering laboratory space for air-to-air, air-to-surface, and surface-to-air, and fuze and sensor research, development, test, and evaluation in direct support of NAWCWPNS Assigned Programs.

**INFORMATION & ELECTRONIC WARFARE (I&EW) SYSTEMS LABORATORIES:** The various NAWCWPNS I&EW systems laboratories provide life-cycle support for airborne EW systems, including warning receiver, jammer, EO/IR, missile-warning, countermeasures, and support systems; software support for the EA-6B aircraft as well as for prime multiplatform EW systems; and system engineering support, including system design and integration, development of information systems, and fleet system software upgrades for warning, jamming, and decoy systems.

**SIMULATIONS:** Extensive simulation capabilities supporting weapons design and development include six-degree-of-freedom (6 DOF) hardware-in-the-loop (HWIL) facilities.

Other facilities include Michelson Laboratory, Lauritsen Laboratory, EW Threat Environment Simulation Facility (EWTES), Solid-State Laboratory, Microelectronics Facility, Explosives R&D

**EQUIPMENT/FACILITIES**

Facility, weapons evaluation range, military targets range, Armitage Field, parachute test facilities, supersonic test tracks, microwave anechoic facilities, RF and IR/EO hardware-in-the-loop simulations.

**Point Mugu, CA:**

**AIR WARFARE EVALUATION FACILITY:** A 121,000 sq. ft. missile system evaluation laboratory which can perform secure missile-in-the-loop seeker-performance testing under simulated operational conditions and against high-fidelity target presentations.

**MISSILE & AIRCRAFT SOFTWARE VALIDATION & TESTING LABORATORIES:** Laboratories are available to support independent software verification, validation and performance testing.

**WEAPON SYSTEM INSTRUMENTATION & DATA ANALYSIS:** These facilities support instrumentation requirements related to tactical missile, aircraft, and other product testing areas. The data analysis laboratories provide near-real-time data extraction and evaluation for timely assessment of aircraft/weapon integration and missile system performance.

Other facilities include ground, air and sea ranges, weapons and tactics analysis center, aircraft weapons survival laboratory, aircraft integration/simulation facilities, strategic systems T&E facility, and radar cross-section facility.

**Patuxent River Station, MD:**

Facilities include: Chesapeake Test Range, Manned Flight Simulator, Air Combat Environmental Test and Evaluation Facility (ACETEF), Antenna and Avionics Test Facility, Electronics Systems Test Facility, Landing Systems Test Facility, Catapult and Arresting Facility, Ship Ground Station, RDT&E hangars, aircraft maintenance facilities, catapult launch system, landing systems test facility, automatic carrier landing system, marine air traffic control, range EW and flight radar cross-section facility, aircraft electrical and environmental evaluation facility, helo-ship data link evaluation facility, EW integrated systems test lab, anechoic chamber, electromagnetic environmental effects facility, EW closed loop facility, target support facility.

**Training Systems Division, Orlando, FL:**

The facilities consist of a two-building complex located on 40 acres of Navy owned land in the Central Florida Research Park, adjacent to the University of Central Florida. This modern complex is the result of a \$23.5M FY85 Navy MILCON project that the organization occupied in mid-1988. The facility totals 281,000 square feet of office, laboratory, cafeteria, conference and meeting room space, with a high bay area, and HVAC/mechanical complex along with several acres of paved parking. In addition, NAWCTSD occupies approximately 203,000 square feet of administrative and storage space as a tenant elsewhere in the Orlando Navy Complex and nationwide at 44 field site locations.

**Trenton, NJ:**

Facilities include: large and small engine altitude test area, large engine sea level test cells, rotor spin facility, fuel and lubricants facility, and helicopter transmission test facility.

**Warminster, PA:**

Facilities include: VP/VS and Lamps Facilities, carrier ASW module lab, ASW engineering lab, vertical flight lab, air common acoustic processor lab, ASW mission planning lab, TACAIR combat training systems facility, TACAIR mission planning and systems development facilities, systems



**EQUIPMENT/FACILITIES**

integration lab, sonar development simulation facility, dynamic flight simulator, vertical decelerator, ejection seat tower, environmental physiology lab, Navy standard signal processor lab, and open water test facility.

**Lakehurst, NJ:**

Facilities include: TC13 MOD 0 and TC 13 MOD 2 Steam Catapult; MK-7 MOD 2 and MK-7 MOD 3 arresting gear; 12,000 ft. test runway dedicated to aircraft launch and recovery equipment development; elevated fixed platform with installed Recovery, Assist, Securing and Traversing (RAST) system; three (3) active jet car test tracks; jet blast deflector site; support equipment test course and Universal Lighting Pad (ULP).

**Indianapolis, IN:**

Computer Aided Design (CAD) equipment, Computer Aided Manufacturing (CAM) equipment; digital avionics simulation laboratory; mobile navigation/communication lab; mission planning center; integrated avionics lab; ASW lab; microwave integrated circuits lab; EP-3/ES-3 integrated test facility; meteorological satellite recovery systems lab; microwave test range; design/development environmental test equipment; engineering design lab; materials lab; stereo lithography equipment; failure analysis equipment; scanning electron microscopes; and model analysis equipment.

Naval Air Warfare Center  
Arlington, VA 22243  
(703) 604-6033

Commander: RADM W. E. Newman  
Technical Dir.: Lewis Lundberg

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	4.700	NA	4.700
6.1 Other	2.200	0.000	2.200
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	52.500	41.200	93.700
6.3	38.500	42.800	81.300
<b>Subtotal (S&amp;T)</b>	<b>97.900</b>	<b>84.000</b>	<b>181.900</b>
6.4	111.300	262.200	373.500
6.5	182.200	218.600	400.800
6.6	149.100	112.600	261.700
6.7	77.900	97.400	175.300
Non-DOD	0.300	0.000	0.300
<b>TOTAL RDT&amp;E</b>	<b>618.700</b>	<b>774.800</b>	<b>1,393.500</b>
Procurement	372.100	1,153.300	1,525.400
Operations & Maintenance	353.400	483.100	836.500
Other	273.900	752.300	1,026.200
<b>TOTAL FUNDING</b>	<b>1,618.100</b>	<b>3,163.500</b>	<b>4,781.600</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	26.300

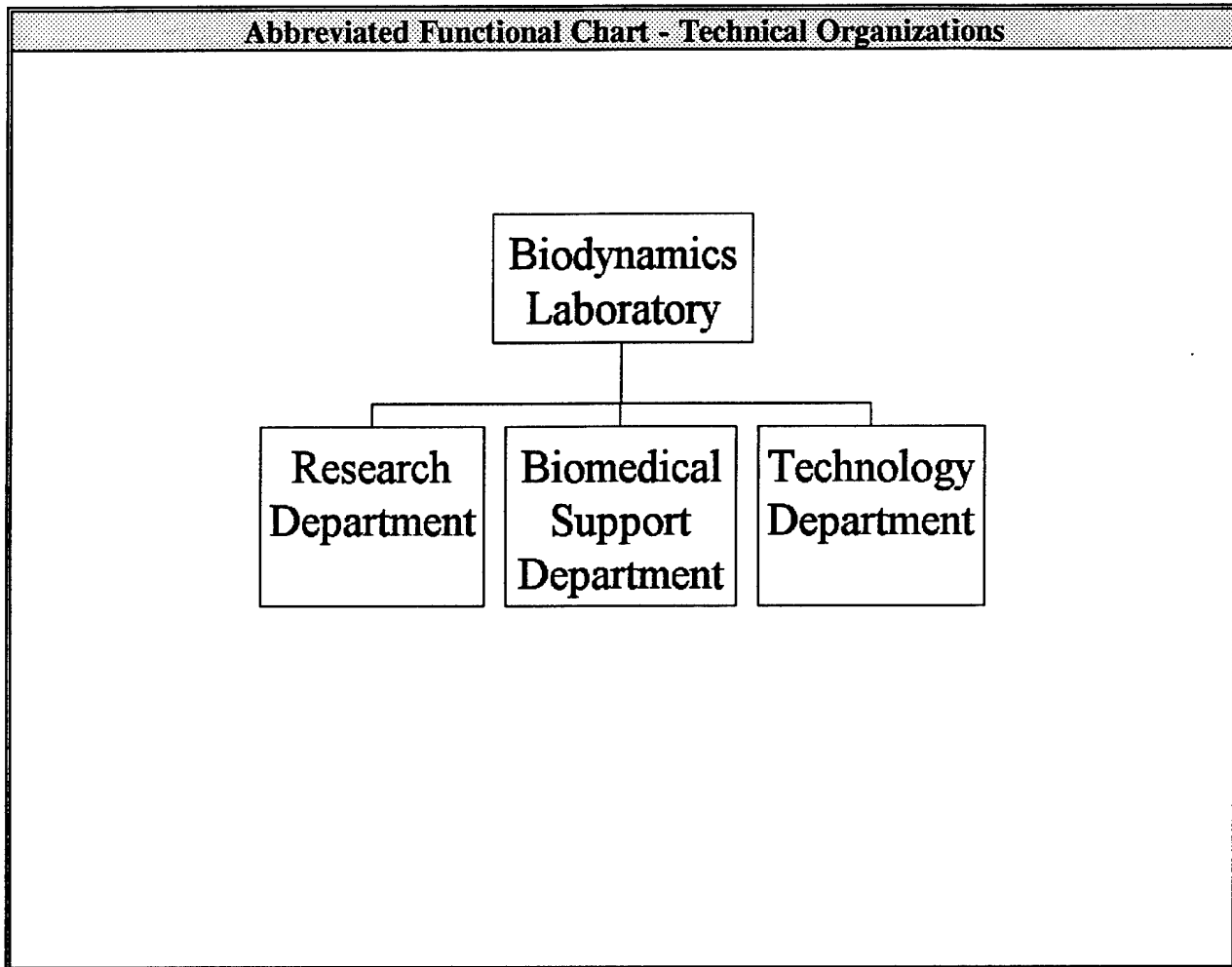
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	2,966	4	68	2,894
CIVILIAN	18,562	233	6,824	11,505
<b>TOTAL</b>	<b>21,528</b>	<b>237</b>	<b>6,892</b>	<b>14,399</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	8,721.000	<b>REAL PROPERTY</b>	1,292.000
ADMIN	2,314.000	* NEW CAPITAL EQUIPMENT	27.000
OTHER	14,671.000	<b>EQUIPMENT</b>	1,080.000
<b>TOTAL</b>	<b>25,706.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	26.000
<b>ACRES</b>	<b>1,271,135</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Naval Biodynamics Laboratory



Naval Biodynamics Laboratory  
New Orleans, LA 70189-0407  
(504) 257-3947

Commander: CDR R. W. Rendin, MSC  
Chief Scientist: Dr. Marc Weiss

### MISSION

To be the principal Navy activity for biomedical research on the effects of mechanical forces (motion, vibration, and impact) encountered in ships and aircraft on naval personnel; to establish human tolerance limits for these forces; and to develop preventive and therapeutic methods to protect personnel from the deleterious effects of such forces.

### CURRENT IMPORTANT PROGRAMS

Determination of Human Dynamic, Injury and Performance Response to Impact Acceleration.  
Development of Validated Manikin Components.  
Protection of Naval Personnel from Adverse Effects of Ship Motion.

### EQUIPMENT/FACILITIES

The Naval Biodynamics Laboratory (NBDL) is one of the eight laboratories under the Naval Medical Research and Development Command, headquartered in Bethesda, Maryland. NBDL is the primary Navy command conducting biomedical research on the effects of mechanical forces, establishing human tolerance limits to these forces and developing approaches to minimize their adverse effects. NBDL has several unique man-rated test devices which include:

#### HORIZONTAL ACCELERATOR

A nitrogen powered horizontal accelerator capable of delivering 225,000 lbs of thrust propelling a payload along a 200 meter indoor track.

Max. acceleration	140g.
Max. payload	5000lbs.
Max. velocity	150 ft./sec.
Power stroke	9.84 ft.
Pulse shape	half-sine, modified square trapezoidal
Pulse duration	.200 sec.
Track length	700 ft.
Sled dimensions	12 ft. x 4 ft.
Data acquisition	16 channel FM (telemetry), 28 channel digital

**EQUIPMENT/FACILITIES****VERTICAL ACCELERATOR**

A nitrogen powered vertical accelerator capable of delivering 40,000 lbs of thrust with a 13 meter maximum range.

Max. acceleration	75g.
Max. payload	1500 lbs.
Max. velocity	65 ft./sec.
Power stroke	3.5 ft.
Pulse shape	half-sine, triangular trapezoidal
Pulse duration	.200 sec.
Height	36 ft.
Carriage dim.	2.5 ft. x 6 ft.
Data acquisition	16 channel FM (telemetry), 28 channel digital

**SHIP MOTION SIMULATOR**

The Navy's only ship motion simulator capable of simulating ship motions with three degrees of freedom.

Degrees of freedom	3 (heave/pitch/roll)
Heave stroke length	22 ft.
Heave freq. response	0.04 to 4.0 Hz.
Angular displacement	30 degrees (pitch and roll)
Angular velocity	25 degrees/sec (pitch and roll)

**TRI-AXIAL TILT ROTATION CHAIR**

Rotation: Variable up to 20 RPM, clockwise or counter-clockwise

Pitch and roll: Total range of 80 degrees (+/- 40 deg)

**ELECTRO-HYDRAULIC SHAKER**

A vertical electrohydraulic shaker with a 500 pound, +/- 15 centimeter stroke capacity.

Frequency response	1 to 500 Hz
Stroke length	12 in
Payload capacity	500 lbs

Naval Biodynamics Laboratory  
New Orleans, LA 70189-0407  
(504) 257-3947

Commander: CDR R. W. Rendin, MSC  
Chief Scientist: Dr. Marc Weiss

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.000	0.000	0.000
6.3	2.838	0.350	3.188
Subtotal (S&T)	2.838	0.350	3.188
6.4	0.000	1.540	1.540
6.5	0.000	0.000	0.000
6.6	2.887	0.174	3.061
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>5.725</b>	<b>2.064</b>	<b>7.789</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>5.725</b>	<b>2.064</b>	<b>7.789</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

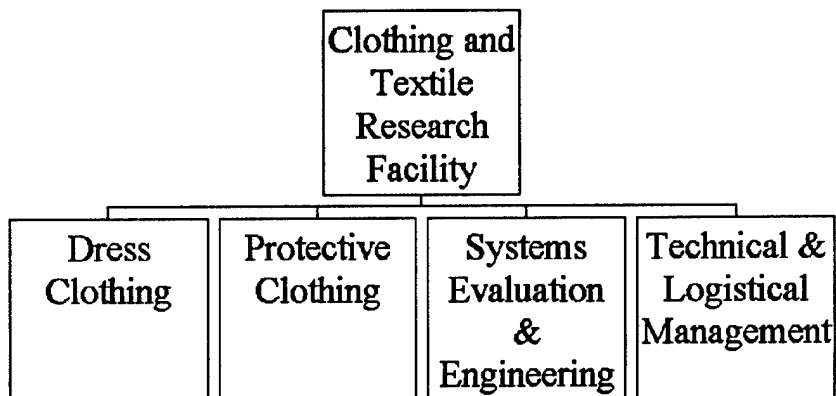
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	12	2	0	10
CIVILIAN	30	3	11	16
<b>TOTAL</b>	<b>42</b>	<b>5</b>	<b>11</b>	<b>26</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	25.845	<b>REAL PROPERTY</b>	2.263
ADMIN	27.907	* NEW CAPITAL EQUIPMENT	0.000
OTHER	0.000	<b>EQUIPMENT</b>	4.727
<b>TOTAL</b>	<b>53.752</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
<b>ACRES</b>	<b>2</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Navy Clothing and Textile Research Facility

## Abbreviated Functional Chart - Technical Organizations





**Navy Clothing and Textile Research Facility**

Natick, MA 01760-0001

(508) 233-4172

Commander: CDR K. T. Adams

Technical Dir: Barbara A. Avellini, Ph.D.

**MISSION**

Conduct research, development, test and evaluation and provide engineering support in clothing, textiles, and related fields associated with service clothing and environmental protective clothing.

**CURRENT IMPORTANT PROGRAMS**

1. Joint Services Lightweight Integrated Suit Technology (JSLIST) is a joint service program to develop a garment which will be protective in chemical-biological contaminated environments and can be used in one form or another by all services.
2. Non-Development Items (NDI) Program is designed to provide state-of-the art, commercially available, firefighter's protective clothing, flame resistant utility uniforms, anti-exposure suits, cold and wet weather ensembles and life-support systems and equipment for Navy personnel which meet appropriate performance requirements for the shipboard environment. Performance requirements/testing procedures are developed at NCTRF to enable commercial products to be qualified through NCTRF laboratory testing and Fleet evaluation. Testing includes conformance to standards and Navy unique requirements designed to analyze the protective capabilities of materials and clothing.
3. Electrochemical Compressor - New technology to power a personal microclimate cooling system which will result in lower weight and more efficient cooling capacity.
4. Phase Change Materials - New technology which will be used to extend the range of comfort for individuals exposed to warm and cold environments, as well as to enhance the performance of protective clothing. This technology can also be useful to the private sector.
5. The Air Force Fire Fighters Hazmat Ensemble is a program to develop technology for a totally integrated firefighters ensemble for protection against fire and hazardous materials. No such protection currently exists. This ensemble can also be used by the private sector.

**EQUIPMENT/FACILITIES**

Major equipment and facility capabilities include:

A thermal manikin system is used to measure insulation values of protective clothing in both an air and a water immersion environment. This is one of only four known manikins worldwide capable of being used in both water and air; the thermal hand and thermal foot are used to measure insulation values of handwear and footwear, respectively. Worldwide, there are only three other known thermal hands and one other known thermal foot; the environmental test chamber reproduces extremes from -40°F to 130°F at 5% to 95% relative humidity, with wind speeds up to 25 mph. The hydro-environmental simulator is the only known chamber within the Navy that is able to independently control both air and water temperatures simultaneously, and thus simulate any air/water interface. A Gerber Micromark/Silhouette computer-aided design system to grade, alter, and trace patterns, and to cut hard patterns; a shipboard laundry laboratory; a thermal flammability laboratory; physiological test and evaluation equipment. Instron testers, weatherometers, fadeometers, launderometer, tear tester, etc., used to determine the physical characteristics of clothing and textiles. A traversing thermocouple instrumented manikin used to evaluate fire resistant protective clothing at variable heat flux levels and exposure times when exposed to a propane-fueled fire in an enclosed area.

Navy Clothing and Textile Research Facility  
 Natick, MA 01760-0001  
 (508) 233-4172

Commander: CDR K. T. Adams  
 Technical Dir: Barbara A. Avellini, Ph.D.

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.271	0.363	0.634
6.3	0.904	0.429	1.333
Subtotal (S&T)	1.175	0.792	1.967
6.4	0.155	0.708	0.863
6.5	0.000	0.000	0.000
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>1.330</b>	<b>1.500</b>	<b>2.830</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	1.668	0.879	2.547
Other	0.097	0.176	0.273
<b>TOTAL FUNDING</b>	<b>3.095</b>	<b>2.555</b>	<b>5.650</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

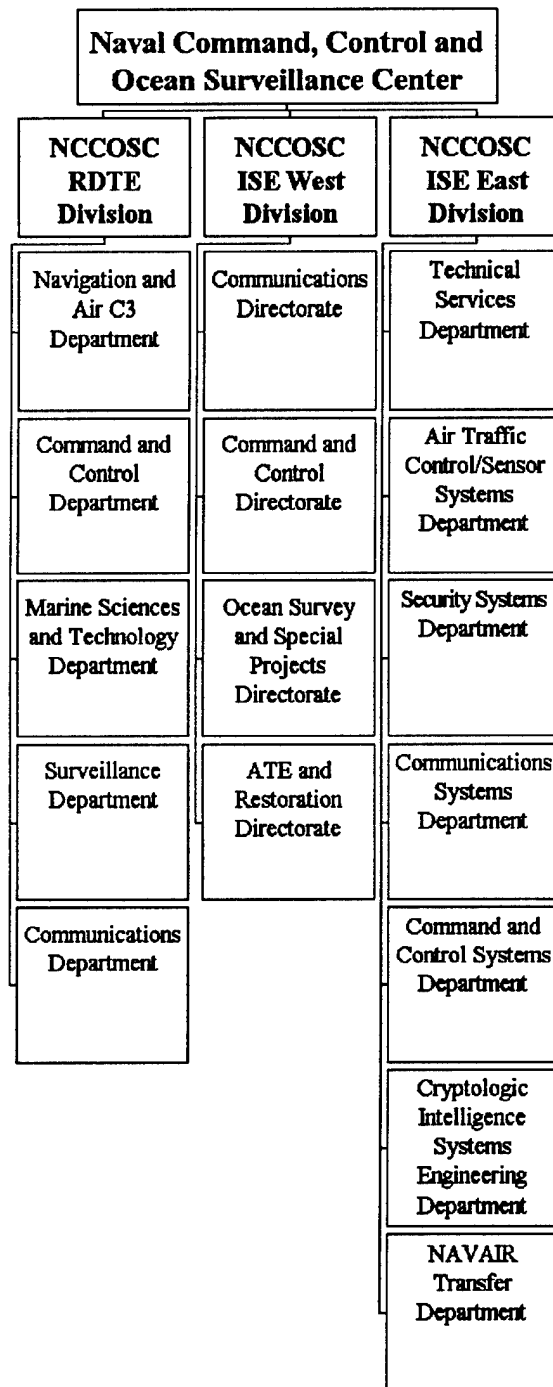
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	1	0	1	0
CIVILIAN	50	1	32	17
<b>TOTAL</b>	<b>51</b>	<b>1</b>	<b>33</b>	<b>17</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	12.667	REAL PROPERTY	0.000
ADMIN	16.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	5.630	EQUIPMENT	2.111
<b>TOTAL</b>	<b>34.297</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.800
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Command, Control and Ocean Surveillance Center

## Abbreviated Functional Chart - Technical Organizations



**Naval Command, Control and Ocean Surveillance Center**

San Diego, CA 92147-5088  
(619) 553-9740

Commander: CAPT Anthony W. Lengerich  
Tech. Director: Paul Wessel

**MISSION**

To be the Navy's full spectrum research, development, test and evaluation, engineering and fleet support center for command, control and communications systems and ocean surveillance and the integration of those systems which overarch multiplatforms. Leadership areas: Command, Control and Communication Systems; Command, Control and Communication Systems Countermeasures; Ocean Surveillance Systems; Command, Control and Communication Modeling and Analysis; Ocean Engineering; Navigation Support; Marine Mammals; Integration of Space Communication and Surveillance Systems.

**CURRENT IMPORTANT PROGRAMS**

SHF/EHF/UHF Satellite Communications; VLF Communications; Caribbean Regional Operations Center; Air Traffic Control; Submarine Electronic Support Measures; Hierarchical Yet Dynamically Reprogrammable Architecture (HYDRA); Relocatable Over the Horizon Radar; Naval Tactical Command Support System; Royal Saudi Naval Forces C3 Upgrade; Global Positioning System; Joint Tactical Information Distribution System; Multifunctional Information Distribution System; Advanced Combat Direction System Block 0 and Block 1; Joint Maritime Command Information System; Global Command and Control System; Command and Control Processor; Combat ID Systems Development; Marine Mammal Systems; Consolidated Cryptologic Program; Tactical Receive Equipment (TRE)/TRE Related Applications; Multimission Advanced Tactical Terminal/Prototype Information Correlation Exploitation System; Surveillance Towed Array Sensor System; Advanced Deployable System; Fixed Distribution System; Communications Support System; Theater Missile Defense; Submarine Communications.

**EQUIPMENT/FACILITIES**

The Naval Command, Control and Ocean Surveillance Center (NCCOSC) maintains over 90 major facilities in support of the warfare center mission. Special purpose test beds, simulators, laboratories, calibration facilities and repair shops support development, engineering, prototyping, integration, installation, test, and life cycle support of the command, control, communication and surveillance systems for which NCCOSC is responsible. Some of the unique or special interest facilities are listed below by location.

**RDT&E Division, San Diego, CA:**

High Performance Computing Laboratory providing a wide range of advanced computer systems for the scientific investigation of next-generation architectures. Microelectronics Laboratory for the manufacture of products unavailable commercially. Research, Evaluation and Systems Analysis

**EQUIPMENT/FACILITIES**

(RESA) facility: a large-scale computer-based simulation/wargaming system used to support a variety of applications including C3I architecture assessment, concept of operations development, advanced technology evaluation, joint exercises, and test and evaluation of advanced systems. Ship Antenna Model Range includes ground planes, model ships, track, towers, control systems, test equipment, and data reduction computers allowing simulation and modeling of ship communications.

**RDT&E Division Detachment, Warminster, PA:**

Aircraft Motion Simulator providing a dynamic test environment for evaluating aircraft navigation systems. Simulated Ships Motion Facility (SCORSBY): a 4,000 sq. ft. facility housing three large ship motion simulators that have the capacity to accommodate navigation systems weighing up to 3,000 lbs., designed to apply controlled roll, pitch, and heading motions to new technology navigation systems and incorporate the capability for high-accuracy dynamic readouts for strategic and tactical applications.

**NISE West, San Diego, CA:**

Tactical Systems Support Complex: a Sensitive Compartmented Information facility supporting electronic support measures systems. Outboard Calibration Facility: the only West Coast signal generation site designed to provide controlled stimulus to calibrate direction finding capability on OUTBOARD ships. Cryptographic Repair Facility supports all Navy cryptographic equipment worldwide. Radioactive Detection Indication and Calibration (RADIAC) equipment repair and calibration lab. Automatic Test Equipment Lab for testing and screening the most sophisticated DOD electronic equipment and systems. Fleet Maintenance Agent TSTP Lab providing in-service maintenance engineering, design analysis, and evaluation of satellite navigation systems, automated communications equipment, and message processing distribution systems.

**NISE East Detachment, Norfolk, VA:**

Fleet Tactical Communications Facility provides shipboard communication systems test beds, linked to various other labs and test beds, allowing design, fabrication, assembly, testing, and certification of communications interface units and special communications applications. INFOSEC Lab provides mock-up capability for integration of network security products and capability for test, evaluation and integration of Navy cryptographic equipment. Shore Communications Systems Facility contains operational secure communications subsystems interconnected to allow system validation, remote technical assistance worldwide, and design of subsystems interface elements for communications programs.

**NISE East, Charleston, SC:**

AN/GPN-27 Radar Site, an Air Traffic Control Airport Surveillance Radar (ASR-8) providing modification and standardization testing. E3 Simulation and Test Lab provides test capability for EMC, EMI and RADHAZ efforts and includes a MIL-STD 461D test enclosure for development of test procedures and applications for analysis and resolution of fleet EMI problems. METOC Facility provides a unique facility for testing of meteorological and oceanographic systems. RADIAC Standardization and Calibration Facility houses an AN/UDM-1 Calibration Range employing the Navy's prime standard (Cesium 137) for gamma radiation instrument calibration, an AN/UDM-7 Calibrator employing the Navy's prime standard (Plutonium 239) for alpha radiation instrument calibration, and an MX-9335 Fast Neutron Range, the Navy's prime standard for neutron radiation indication and computation instrument calibration.

## Naval Command, Control and Ocean Surveillance Center

San Diego, CA 92147-5088

Commander: CAPT Anthony W. Lengerich

(619) 553-9740

Tech. Director: Paul Wessel

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	2.540	NA	2.540
6.1 Other	3.630	44.000	47.630
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	42.840	82.240	125.080
6.3	32.940	86.860	119.800
<b>Subtotal (S&amp;T)</b>	<b>81.950</b>	<b>213.100</b>	<b>295.050</b>
6.4	34.520	31.890	66.410
6.5	35.570	46.560	82.130
6.6	7.880	10.890	18.770
6.7	49.780	56.390	106.170
Non-DOD	0.170	0.010	0.180
<b>TOTAL RDT&amp;E</b>	<b>209.870</b>	<b>358.840</b>	<b>568.710</b>
Procurement	167.840	356.760	524.600
Operations & Maintenance	181.390	213.390	394.780
Other	70.670	89.670	160.340
<b>TOTAL FUNDING</b>	<b>629.770</b>	<b>1,018.660</b>	<b>1,648.430</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

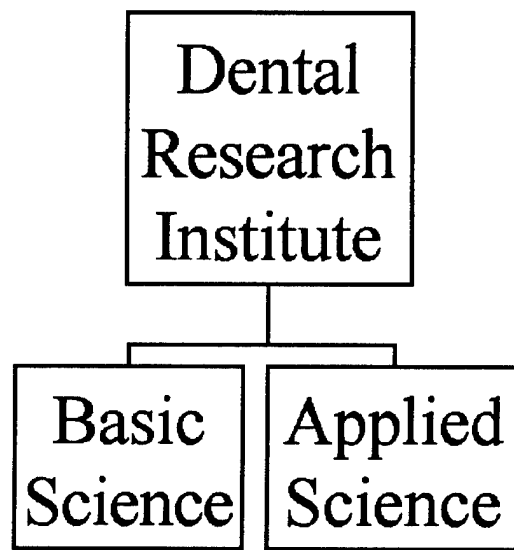
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	111	2	21	88
CIVILIAN	5,285	190	2,305	2,790
<b>TOTAL</b>	<b>5,396</b>	<b>192</b>	<b>2,326</b>	<b>2,878</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	2,819.900	<b>REAL PROPERTY</b>	227.000
ADMIN	634.700	* NEW CAPITAL EQUIPMENT	3.000
OTHER	1,606.700	<b>EQUIPMENT</b>	209.000
<b>TOTAL</b>	<b>5,061.300</b>	* NEW SCIENTIFIC & ENG. EQUIP.	15.800
<b>ACRES</b>	<b>3,650</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

Naval Dental Research Institute

Abbreviated Functional Chart - Technical Organizations





**Naval Dental Research Institute**  
Great Lakes, IL 60088-5259  
(847) 688-5647

Commanding Officer: CAPT Stephen A. Ralls, DC  
Chief Scientist: Dr. Lloyd G. Simonson

### **MISSION**

To research, develop, test, and evaluate new methods and materials that limit oral disease, reduce dental emergencies, maximize operational readiness, and promote dental wellness for Navy and Marine Corps personnel.

### **CURRENT IMPORTANT PROGRAMS**

Current Important Programs:

1. Develop rapid chairside risk assessment test for dental caries (patent pending); prototypes completed with Editek, Inc.
2. Develop rapid chairside risk assessment test for periodontal diseases (two patents pending); prototype manufacture underway with Editek Inc. Develop use of fluorescence polarization as technique for rapid diagnosis (NDRI patent pending) with Jolley Consulting and Research Inc.
3. Develop system and apparatus to remove mercury from dental waste water (two patents pending). Contract for constructing waste water effluent metering tank with Piper Plastics, Inc. Contract for constructing collection cones with Dolphin Industries, Inc. Industrial mercury recovery compound adapted for aqueous use with ADA Technologies, Inc.
4. Develop radiographic system to identify dental disease progression; human testing initiated.
5. Evaluate a Navy-wide managed dental care delivery system.
6. Collect and analyze dental epidemiologic data.
7. Develop multimedia dental diagnostic and treatment system for remote site use; prototype complete.
8. Develop multimedia dental examiner calibration system.
9. Develop improved patient tracking/data collection with Smartcard and optical mark recognition.
10. Develop advanced imaging of pathologic conditions with applied 3D computer visualization.

**EQUIPMENT/FACILITIES**

44,235 square feet AAALAC-accredited animal colony

A comprehensive dental research library; numerous volumes and journals with direct MEDLINE access

Electron microscope capability

Extensive computer and data processing facilities

Direct access to large military populations and the Navy's only Recruit Training Center

Direct access to the American Dental Association, three university dental schools, a large VA hospital, a large Naval Hospital, a major Naval Dental Center, and the headquarters of nearly 50 leading dental organizations

A gas chromatography microbial identification system

Numerous other state-of-the art equipment

Direct access to the National Institute of Dental Research, National Library of Medicine, the National Institute of Standards and Technology, and National Institutes of Health (NDRI Bethesda detachment)

Atomic Absorption Analyzer

Naval Dental Research Institute  
Great Lakes, IL 60088-5259

Commanding Officer: CAPT Stephen A. Ralls,  
DC

(847) 688-5647

Chief Scientist: Dr. Lloyd G. Simonson

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.243	NA	0.243
6.1 Other	0.000	0.149	0.149
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.000	0.000	0.000
6.3	0.510	0.277	0.787
<b>Subtotal (S&amp;T)</b>	<b>0.753</b>	<b>0.426</b>	<b>1.179</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.663	0.000	0.663
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>1.416</b>	<b>0.426</b>	<b>1.842</b>
Procurement	0.083	0.014	0.097
Operations & Maintenance	0.000	0.000	0.000
Other	0.000	0.050	0.050
<b>TOTAL FUNDING</b>	<b>1.499</b>	<b>0.490</b>	<b>1.989</b>

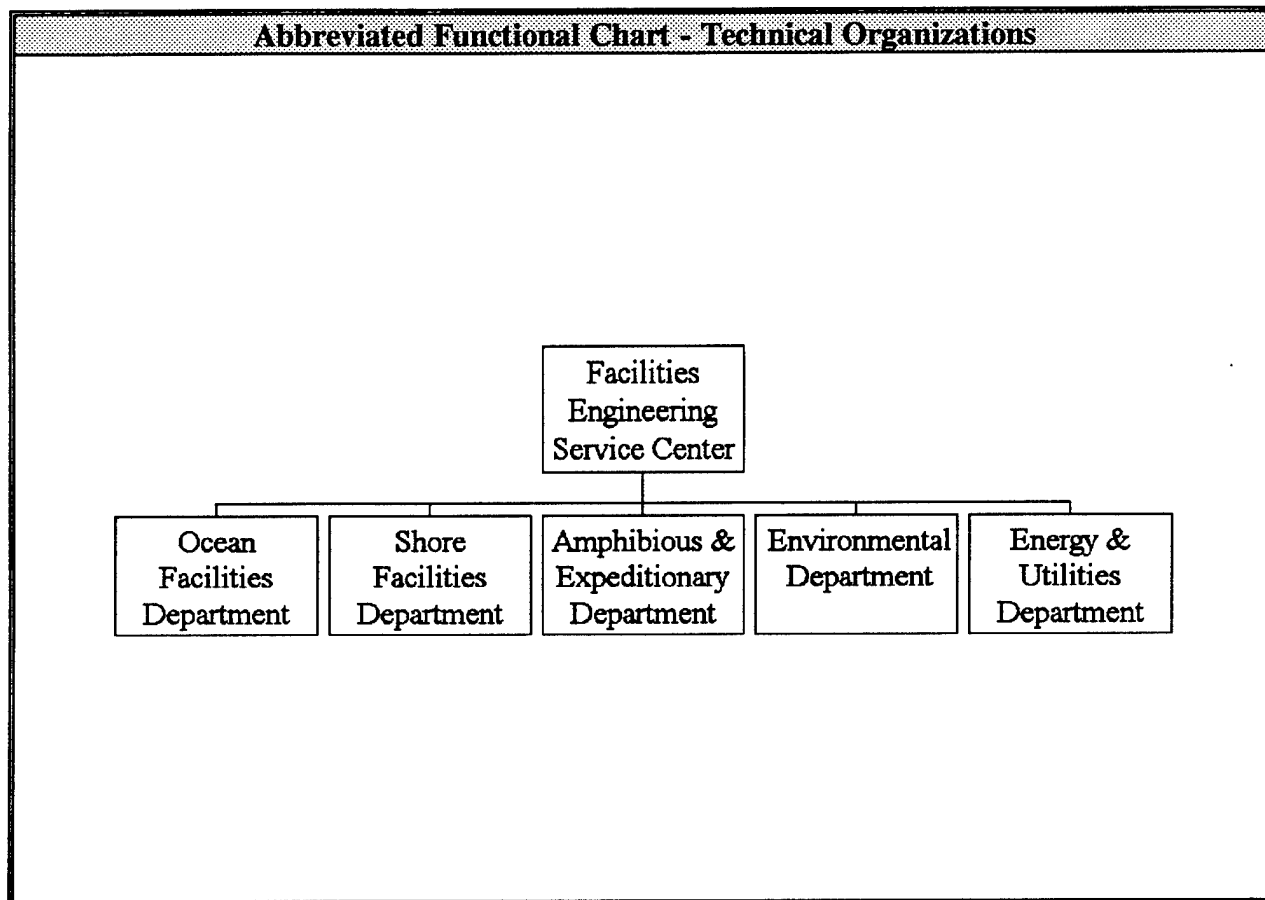
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	27	9	0	18
CIVILIAN	10	4	1	5
<b>TOTAL</b>	<b>37</b>	<b>13</b>	<b>1</b>	<b>23</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	21.264	<b>REAL PROPERTY</b>	5.000
ADMIN	6.001	* NEW CAPITAL EQUIPMENT	0.000
OTHER	9.318	<b>EQUIPMENT</b>	1.006
<b>TOTAL</b>	<b>36.583</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.124
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Facilities Engineering Service Center



Naval Facilities Engineering Service Center  
Port Hueneme, CA 93043-4328  
(805) 982-1393

Commanding Officer: CAPT John P. Collins  
Chief Engineer: Get Moy

### MISSION

To provide innovative technology products and services required to improve the acquisition, operation, and maintenance of Navy Shore and Ocean Facilities and to enhance the Seabees and Marine Corps operational readiness capabilities.

### CURRENT IMPORTANT PROGRAMS

Defense Environmental Restoration Program. Pollution Prevention. Navy Shore Facilities Improvement. Deep Ocean Technology in support of ASW. Marine Corps Amphibious Logistics. Navy Construction Forces System. Ocean Tests Ranges. Underwater Construction Force Systems. Explosive Safety. Physical Security Systems. Independent Exploratory Development. Independent Research. Army and Air Force support.

### EQUIPMENT/FACILITIES

Deep Ocean Simulation Laboratory. Shallow Water Dive Tank. Ballistic Test Facility for testing security products. Metallurgical Material Laboratory. Chemistry Laboratory. Water Purification Laboratory. Steamboiler Laboratory. Electromagnetic Pulse Test Facility. Environmental Protection Laboratory. Physical Security Test Facility. Soils Laboratory. Heavy Equipment Test Facility. Helo lift test site. High temperature pavements stand.

Deep Ocean Simulation Laboratory- This is the largest facility of its kind on the West Coast. It contains 12 pressure vessels capable of simulating the deep ocean environment under controlled conditions. It is used for certifying fleet hardware and support technology validation and testing. Test facilities and services are rented to the industries.

Shallow Water Dive Tank- A 30 ft. diameter, 65,000 gallon seawater tank for testing oceanographic equipment, diver construction techniques, diver tools and underwater NDT equipment.

Motor Vessel *Independence*- A 200 ft. vessel outfitted to support ocean engineering research and undersea equipment validation testing. The *Independence* has an internal wet well and crane system for installation and retrieval of underwater systems.

Environmental Laboratory- This facility supports the laboratory studies needing GC/MS, GC, and/or Microtox evaluations.

**EQUIPMENT/FACILITIES**

**High Temperature Pavements Test Facility-** Controlled high temperature blast facility which simulates the jet blast of an aircraft auxiliary power unit. Used to test concrete mixtures from the effects of blasts from F/A-18, B-1 and AV-8B aircraft.

**Line/Cable Testing Facility-** An 80ft test site that applies static loads up to 200,000-lb or cyclic loads up to 100,000-lb on wire ropes, synthetic lines, and electromechanical cables.

**Controlled Suspension Test Fixture-** This unique 100 ft. x 50 ft. x 3 ft. deep facility provides specialized survivability testing of full-sized seafloor cabling in a flowing water environment.

**Seawater Test Facility-** Test site for development, test and evaluation of seawater desalination equipment and expeditionary water treatment devices for production of potable water.

**Cold Test Chamber-** Environmental chamber for testing equipment down to -50 degrees F.

**Battery Laboratory-** This facility was originally equipped to support testing and evaluation of batteries for the Deep Submergence Rescue Vehicle under simulated ocean conditions in conjunction with the pressure vessels of the Deep Ocean Simulation Laboratory. Large battery chargers, load banks, cell monitoring voltage scanners, and electrolyte handling equipment are used to conduct tests on silver-zinc batteries for the Navy's deep submergence vessels.

**Flexor Test Stand-** Computer controlled test rig capable of applying cyclical test loads of up to 300,000 lbs for dynamic barge loading tests of Flexor Pontoon connectors.

**Fiber Optics Laboratory-** A 2,000 sq. ft. facility with temperature controlled cleanrooms for preparing optical glass fibers for precision optical measurements.

**Geotechnical Modeling Test Facility-** The only Navy facility utilizing the controlled dragging of implements through soils at metered rates for monitoring soil behavior. The facility is used for testing model anchors, site assessment tools, cable plows, and other implements for penetrating the seafloor.

**Mobile Test Bed-** All terrain tracked vehicle which can reach speeds of 50 mph, providing up to 50,000-lb draw bar pull, while delivering 300-hp through an auxiliary hydraulic power unit. The MTB is useful in evaluating the mobility of construction and material handling equipment on various surfaces and slopes.

Naval Facilities Engineering Service Center  
 Port Hueneme, CA 93043-4328  
 (805) 982-1393

Commanding Officer: CAPT John P. Collins  
 Chief Engineer: Get Moy

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	4.593	2.327	6.920
6.3	11.157	9.593	20.750
<b>Subtotal (S&amp;T)</b>	<b>15.750</b>	<b>11.920</b>	<b>27.670</b>
6.4	0.890	0.648	1.538
6.5	0.463	0.834	1.297
6.6	0.845	0.101	0.946
6.7	0.733	0.000	0.733
Non-DOD	0.708	0.000	0.708
<b>TOTAL RDT&amp;E</b>	<b>19.389</b>	<b>13.503</b>	<b>32.892</b>
Procurement	3.925	29.817	33.742
Operations & Maintenance	39.492	25.592	65.084
Other	16.010	16.056	32.066
<b>TOTAL FUNDING</b>	<b>78.816</b>	<b>84.968</b>	<b>163.784</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.300

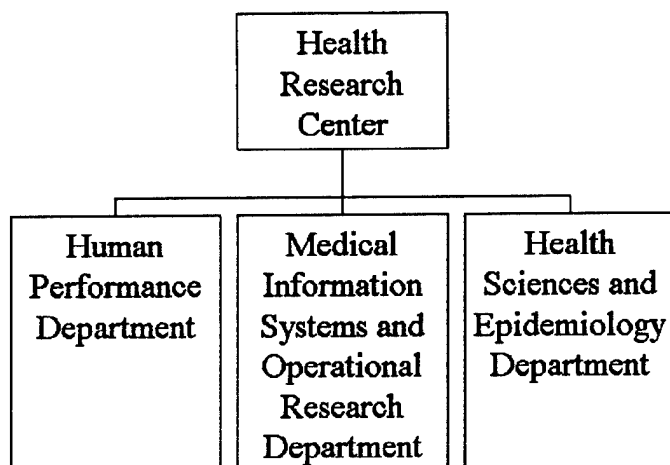
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	21	0	13	8
CIVILIAN	528	22	260	246
<b>TOTAL</b>	<b>549</b>	<b>22</b>	<b>273</b>	<b>254</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	112.000	<b>REAL PROPERTY</b>	7.479
ADMIN	129.900	* NEW CAPITAL EQUIPMENT	0.700
OTHER	74.500	EQUIPMENT	8.700
<b>TOTAL</b>	<b>316.400</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.700
<b>ACRES</b>	<b>33</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Health Research Center

## Abbreviated Functional Chart - Technical Organizations





Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-8400

Commanding Officer: CAPT Larry M. Dean  
Scientific Dir: Dr. Don Stephen Nice

### MISSION

Mission Statement - To support fleet operational readiness through research, development, test, and evaluation on the biomedical, psychological, and physiological aspects of Navy and Marine Corps personnel health and performance; and to perform other related tasks that may be directed by higher authority.

### CURRENT IMPORTANT PROGRAMS

Current Important Programs - The R&D mission at Naval Health Research Center (NAVHLTHRSCHCEN) addresses three programmatic/functional areas:

- (1) Health Sciences and Epidemiology
- (2) Medical Information Systems and Operational Research
- (3) Human Performance

Within these functional program areas are project areas, each comprised of one or more research efforts.

- \* Environmental Extremes
- \* Occupational Health
- \* Alertness Management Systems
- \* Work Physiology
- \* Disease Surveillance
- \* Health Care Policy
- \* Special Operations
- \* Epidemiology
- \* Health Promotion
- \* Modeling of Human Performance
- \* Musculoskeletal Injury
- \* Biological Rhythms
- \* HIV Studies and Registry
- \* Model and Forecasting
- \* Cognitive Electrophysiology
- \* Infectious Disease Studies
- \* Psychological Stress
- \* Expert Systems
- \* Alcohol Rehabilitation
- \* Medical Informatics
- \* Defense Women Health Research Programs
- \* Unexplained Gulf War Illness Syndrome
- \* Microclimate Cooling
- \* Phase Change Materials

**EQUIPMENT/FACILITIES****Human Performance/Environmental Physiology Laboratory:**

A unique facility with a capability readily applied to any military platform need in the Fleet. Proximity to the San Diego and West Coast fleet maximizes tech transfer into the operational forces. Capability can also be mobile and can set-up a temporary human performance laboratory anywhere in CONUS and OCONUS.

**Equipment:**

Two environmental chambers: temperature range -20°F to 180°F; humidity 20-85%.

Immersion tank: allows whole-body exposure, with temperature range of 45°F to 110°F.

Swim flume: allows exposure to hot or cold moving water at 0 to 4 knots with temperature range of 45°F to 90°F.

Ergonometry equipment: Treadmills, cycles, skiing, upper body and swimming. Open-circuit spirometry metabolic measurement systems. Muscle strength and endurance computerized measurement systems.

Biomechanics laboratory: Motion, ground reaction forces, EMG, equilibrium.

Biochemistry laboratory: Clinical/hormonal chemistries.

Electromyograph laboratory: EMG devices and computerized analysis equipment.

Body composition laboratory: Anthropometric, hydrodensitometry, dual-energy x-ray absorptiometry, whole body water.

Infrared Camera system: measures surface skin temperatures.

Tube suit calorimeter: measures six body regions for heat flux.

Microclimate cooling systems: gel packs, water, air, water/air combined.

Cold weather/high altitude human performance lab at Marine Corps Mountain Warfare Training Center, Bridgeport, CA.

Performance Assessment Battery (PAB): Computerized cognitive function tests.

Biological Rhythms and Sleep Laboratory: Subjects in an isolation facility within the laboratory can be protected from exposure to outside light during sleep recordings. Sustained operations/continuous operations (SUSOPS/CONOPS) and circadian phase shifting studies are also conducted. Laboratory includes areas for cognitive testing and two sound insulated sleep room (one holding up to eight people in bunks for group studies, and a small room for one or two subjects). Four PAB stations are equipped with a variety of performance software linked in a Lantastic network allowing data from all four to be down loaded to the master unit which is equipped with an optical disk device for data storage. Controlled bright light administration is possible with the combination of a built-in light system in the PAB testing room and portable light boxes. The isolation facility also includes a treadmill for exercising subjects.

Equipment: Polysomnography: Three Beckman (SensorMedics) 8 channel polygraphs; one Nihon Kohden 12 channel polygraph; one Nicolet Sleep Wake Analyzer - 3 bed, 32 channel EEG system; 14 Medilog 9000 portable EEG recorders; 1 Medilog 9000 scanner. Evoked Potentials: 1 Neuroscan EEG data acquisition and analysis system; 1 Nicolet Compact Four, portable electrodiagnostic system. Activity Monitors: 9 Ambulatory monitoring actigraphs; 10 ambulatory monitoring Version 6.6 actigraphs; 1 actigraph interface unit with software to download actigraph data to PC.

Miscellaneous: 1 Intoxilyzer breath alcohol analyzer; 2 Criticon Dinamap automatic blood pressure/pulse monitors; 7 386 PCs, one with APX 5200 optical disk drive for data storage; 3 Apollo Light Systems Bright Lite 3 Boxes.

Naval Health Research Center  
San Diego, CA 92186-5122  
(619) 553-8400

Commanding Officer: CAPT Larry M. Dean  
Scientific Dir: Dr. Don Stephen Nice

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.210	0.020	0.230
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.709	0.864	1.573
6.3	3.691	6.790	10.481
<b>Subtotal (S&amp;T)</b>	<b>4.610</b>	<b>7.674</b>	<b>12.284</b>
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.141	0.152	0.293
6.7	0.165	0.290	0.455
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>4.916</b>	<b>8.116</b>	<b>13.032</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.713	0.554	1.267
Other	0.000	0.000	0.000
<b>TOTAL FUNDING</b>	<b>5.629</b>	<b>8.670</b>	<b>14.299</b>

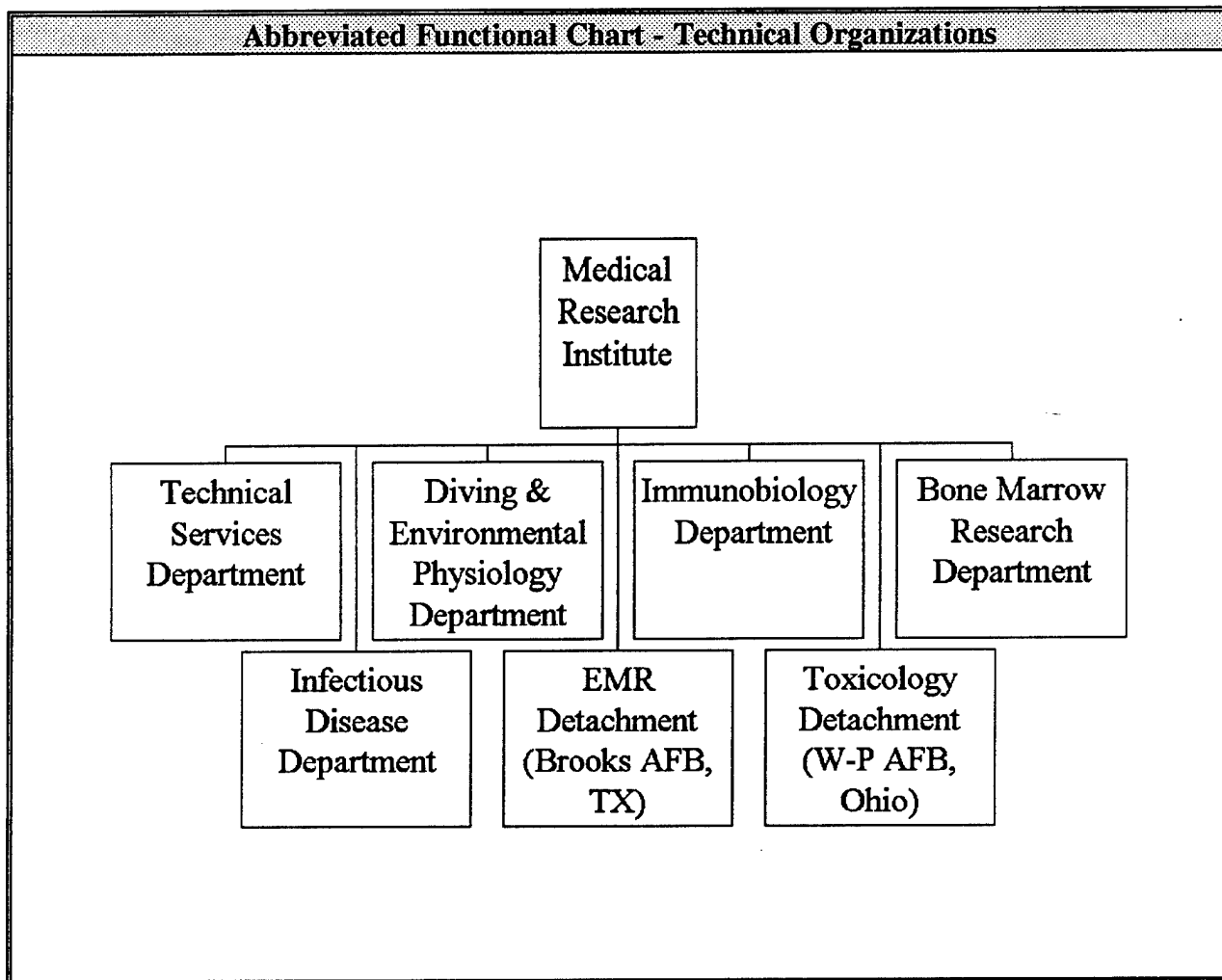
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	22	9	4	9
CIVILIAN	63	12	27	24
<b>TOTAL</b>	<b>85</b>	<b>21</b>	<b>31</b>	<b>33</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	32.330	<b>REAL PROPERTY</b>	0.000
ADMIN	12.250	* NEW CAPITAL EQUIPMENT	0.000
OTHER	2.200	<b>EQUIPMENT</b>	1.896
<b>TOTAL</b>	<b>46.780</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.072
<b>ACRES</b>	<b>0</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Medical Research Institute



**Naval Medical Research Institute**  
Bethesda, MD 20889-5607  
(301) 295-0007

**Commander: CAPT Thomas J. Contreras, Jr.**  
**Scientific Adm: Dr. John J. Ryan**

### **MISSION**

To conduct research, development, tests and evaluations to enhance the health, safety, and readiness of Navy and Marine Corps personnel in the effective performance of peacetime and contingency missions, and to perform such other functions or tasks as may be directed by higher authority.

The specific functions to be accomplished are:

- a. Provide basic and applied research on infectious diseases, tissue transplantation, diving and hyperbaric medicine, casualty care, and environmental medicine and human factors which are directly related to military requirements and operational needs.
- b. Maintain a program of basic biomedical research in areas of military importance to develop knowledge in anticipation of future problems.
- c. Provide the scientific potential for the application of new biomedical knowledge to operational problems.
- d. Provide biomedical research capabilities to support field laboratories, hospitals and other naval activities in problems beyond their scope.
- e. Provide a source of scientific advisors and consultants readily available to operational commands.

### **CURRENT IMPORTANT PROGRAMS**

#### **1. Diving Medicine Program.**

Includes studies on the safety and mission efficiency of diving equipment and procedures (especially decompression procedures), the physiology of diving and oxygen toxicity, novel decompression methods using Hydrogen/Oxygen gas mixtures, methods to improve diver performance, and improved treatment of diving medical problems.

#### **2. Infectious Disease Program**

Includes studies on the development of vaccines, the design and development of rapid diagnostic methods, and the collection and analysis of epidemiological information on significant infectious disease threats to operating forces. Diseases studied include malaria, diarrheal diseases, dengue fever, HIV infection, hepatitis, and rickettsial diseases. Scientific expertise gained in these studies provide the basis for the deployment of field rapid diagnostic laboratories such as those deployed during Operations Desert Shield/Desert Storm and in Somalia. The laboratories were a major factor in the early diagnosis and treatment of disease in our troops, and their consequent rapid return to duty.

**CURRENT IMPORTANT PROGRAMS****3. Combat Casualty Care Program**

Includes studies on enhancement of wound healing, treatment and prevention of septic shock, control of immunological system processes, and methods to control and augment the formation of new blood cells.

**4. Environmental Stress/Toxicology Program**

Includes studies to evaluate the significance of specific environmental factors unique to Navy operations; and to develop standards for exposure to these factors, and/or methods to improve performance of personnel required to operate in these environments. Factors include both hot and cold thermal stress, electromagnetic radiation hazards, and toxicology of numerous Navy-related chemicals.

**5. Bone Marrow Transplantation and Immunology Program**

Includes studies on improved methods for typing of transplantation donors, methods for the isolation and controlled growth of blood cell precursor cells for reconstitution of the hematopoietic system, and the identification of cellular control mechanisms and development of methods for modulation of immune system activity.

**Cooperative Research and Development Agreements**

MicriCarb, Inc. - Large-scale production of a safe and effective vaccine for the prevention of diarrhea caused by the enteropathogenic *Campylobacter* in humans.

SmithKline Beecham Corp. - Research, development and commercialization of a genetically engineered bacterial toxin, LT-R192G, for use as a safe and efficacious mucosal adjuvant (immune enhancer) to be administered with oral vaccines.

SmithKline Beecham Corp. - Development of chimeric and humanized anti-bodies useful for the prevention of malaria.

OraVax, Inc. - Research and development of a native labile toxin and a mutant recombinant toxin as adjuvants for a *H. pylori* vaccine in humans.

Univ. of Maryland - Development and evaluation of quantitative methods to estimate the number of viable pathogens in raw food samples.

Integrated Diagnostics Inc. - Serological test for pathogens of Dengue.

Repligen Corp. - Development of recombinant proteins derived from cell surface costimulatory molecules and small molecules that will bind to these structures.

SRA Technologies, Inc. - Anti-viral cytokine discovery program.

Baxter Healthcare Corp. - Large-scale CD4 growth system.

Cellco, Inc. - Hematopoietic stem cell culture.

**CURRENT IMPORTANT PROGRAMS**

Vical, Inc. - Evaluation of novel vaccine approaches for prevention of malaria using genetic material encoding malarial protein antigens.

Cytel Corp. - Development and testing of recombinant constructs useful in the development of a malaria vaccine.

Agracetus, Inc. - Development of plasmid DNA-based vaccines for the prevention of malaria.

GenPharm International, Inc. - Development and testing of human monoclonal antibodies that are protective against malaria.

Entremed - Development and testing of DNA-based Plasmodium vaccines.

Swiss Serum and Vaccine Institute - Clinical testing of newly developed Cholera vaccines.

Systemix - Bone marrow stem cell expansion.

Pelargic - Real time wrist-worn decompression meter.

Organ, Inc. - Cryopreservation.

**EQUIPMENT/FACILITIES**

Complex of 7 buildings (1 off site) containing approximately 160,000 square feet of laboratories.

The laboratory includes the following specialized facilities or equipment:

1. Man-rated, Deep-dive Hyperbaric Research Chamber Complex:  
A DOD unique diving medical research chamber capable of reaching simulated depths of 300 meters, with full research quality level support systems, and composed of 5 separate, interconnected chambers, one with wet-pot capability.
2. Large Animal Hydrogen Diving Chamber:  
A DOD unique chamber capable of accommodating large animals and using Hydrogen/Oxygen gas mixtures. Designed for use in the study of novel enzymatic decompression techniques.
3. Emergency Hyperbaric Treatment Chamber:  
Special chamber designed for treatment of hyperbaric injuries or other clinical hyperbaric treatments.
4. Scanning Transmission Electron Microscope:  
Standard research quality instrument (approximately 10 years old).
5. Fluorescence Cytometers:  
Three fully capable instruments, two with double-laser capability, one with triple-beam capability.
6. Digital Imaging System

Naval Medical Research Institute  
Bethesda, MD 20889-5607  
(301) 295-0007

Commander: CAPT Thomas J. Contreras, Jr.  
Scientific Adm: Dr. John J. Ryan

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.984	NA	0.984
6.1 Other	1.842	0.838	2.680
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	2.064	1.071	3.135
6.3	4.387	33.323	37.710
<b>Subtotal (S&amp;T)</b>	<b>9.277</b>	<b>35.232</b>	<b>44.509</b>
6.4	2.878	0.978	3.856
6.5	0.000	0.000	0.000
6.6	1.551	0.272	1.823
6.7	0.000	0.000	0.000
Non-DOD	0.154	0.165	0.319
<b>TOTAL RDT&amp;E</b>	<b>13.860</b>	<b>36.647</b>	<b>50.507</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	1.169	0.070	1.239
Other	6.818	2.400	9.218
<b>TOTAL FUNDING</b>	<b>21.847</b>	<b>39.117</b>	<b>60.964</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	231	56	18	157
CIVILIAN	194	30	53	111
<b>TOTAL</b>	<b>425</b>	<b>86</b>	<b>71</b>	<b>268</b>

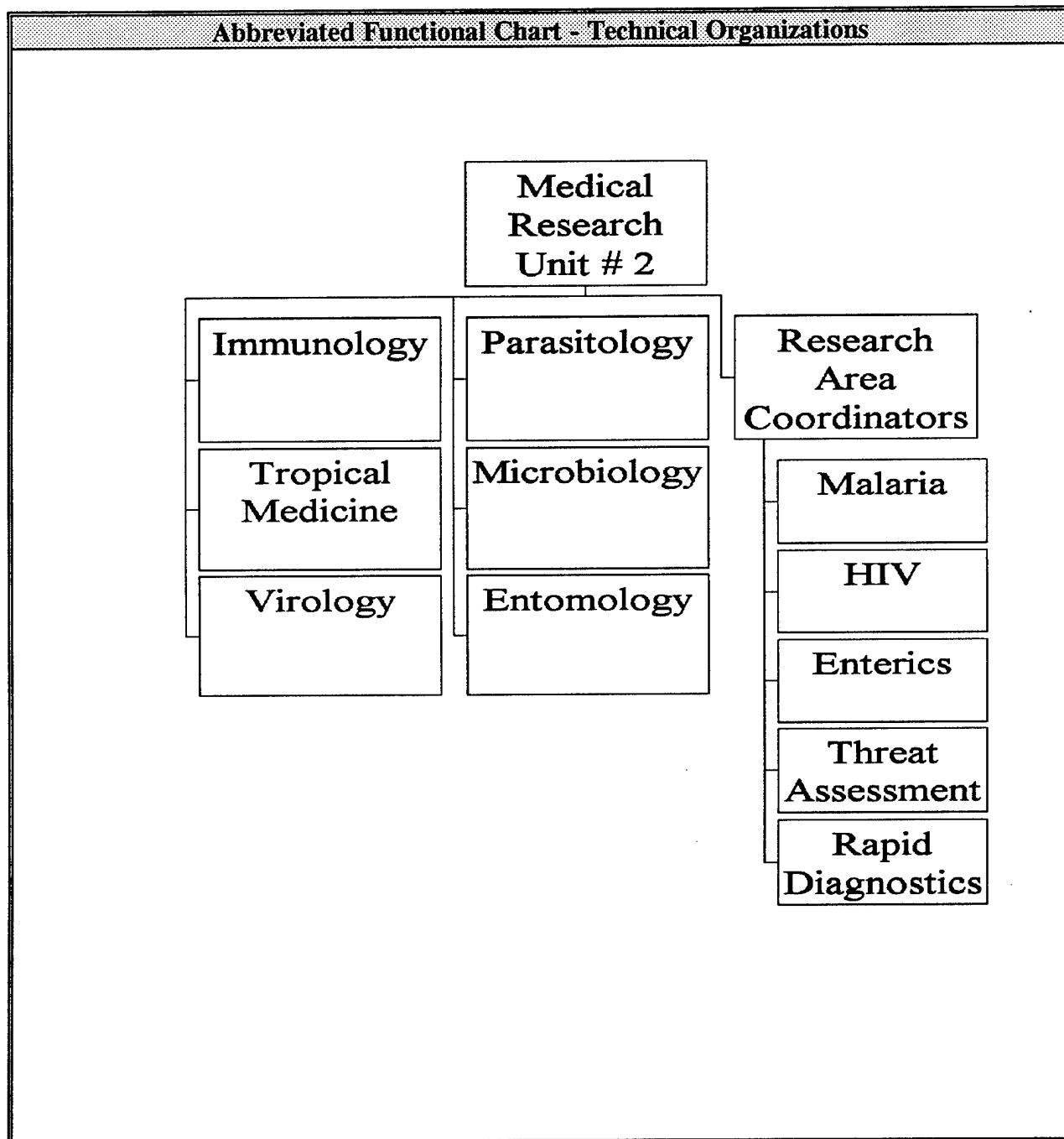
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	161.930	<b>REAL PROPERTY</b>	8.200
ADMIN	63.875	* NEW CAPITAL EQUIPMENT	0.053
OTHER	0.000	<b>EQUIPMENT</b>	15.316
<b>TOTAL</b>	<b>225.805</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.778
<b>ACRES</b>	<b>7</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable



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## Naval Medical Research Unit # 2



**Naval Medical Research Unit # 2**  
Jakarta, Indonesia, 96520-8132  
(62 ) 421-4454

Commander: CAPT H.V. Peterson, MSC  
Exec. Officer: LCDR T.R. Jones, MSC

**MISSION**

Conduct RDT&E in Tropical Medical and Infectious Diseases to maintain and enhance the health, safety, and readiness of Navy and Marine Corp personnel in the performance of peacetime and contingency missions in Southeast Asia and other tropical and subtropical regions.

**CURRENT IMPORTANT PROGRAMS**

Evaluation of new antimalarial agents or combinations of traditional antimalaria agents for the treatment and prevention of malaria in Indonesia.

Development of a malaria vaccine test site.

Development of dengue vaccine test site.

Determining the epidemiology of Hepatitis E Virus infections in Southeast Asia.

Identification of emerging infectious disease threat agents in Southeast Asia. This includes areas in Vietnam frequented by members of the Joint Task Force for Full Accounting in Vietnam, Cambodia and Laos.

Development and evaluation of methods for the rapid identification of infectious disease threat agents such as those responsible for febrile diarrhea, sexually transmitted diseases, and AIDS.

**EQUIPMENT/FACILITIES**

Mosquito breeding colony for parasite vector transmission and susceptibility studies with malaria. Animal colony used in mosquito breeding, parasite studies, and for production of antigens and antibodies. Virology Department has capability of isolation and identification of human viral pathogens and also of performing serological tests for evidence of viral infections. Microbiology Department maintains a comprehensive diagnostic medical microbiology capability and in addition has sophisticated equipment and reagents required for biomolecular identification and characterization of microbial pathogens. Tropical Medicine Department utilizes a double laser flow cytometer for identification of specific white cell types by detecting specific epitopes on the white cell surface. NAMRU-2 also maintains a field laboratory in Jayapura, Irian Jaya which primarily is used to perform malaria related laboratory assays and also to process research specimens for shipment to the Jakarta lab. All departments work closely with counterparts within Indonesian laboratories and hospitals.

The transfer of the Biosafety Level 3 Laboratory to NAMRU-2 Jakarta gives this command a state-of-the-art containment facility that exceeds all current requirements for work with biosafety level 3 pathogens. This facility will allow NAMRU-2 personnel to work safely, both at the lab bench and with experimental animals, with samples from patients with hemorrhagic fever of unknown origin and such regionally important agents as Rickettsia, Japanese B Encephalitis Virus and Hantaan Virus. It will also provide the needed biocontainment for proposed field programs to survey for emerging diseases in Indonesia.

Naval Medical Research Unit # 2  
 Jakarta, Indonesia, 96520-8132  
 (62 ) 421-4454

Commander: CAPT. H.V. Peterson, MSC  
 Exec. Officer: LCDR T.R. Jones, MSC

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.282	0.047	0.329
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.579	0.030	0.609
6.3	0.000	0.065	0.065
Subtotal (S&T)	0.861	0.142	1.003
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	2.508	0.000	2.508
6.7	0.000	0.000	0.000
Non-DOD	0.091	0.000	0.091
TOTAL RDT&E	3.460	0.142	3.602
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	0.999	0.000	0.999
TOTAL FUNDING	4.459	0.142	4.601

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

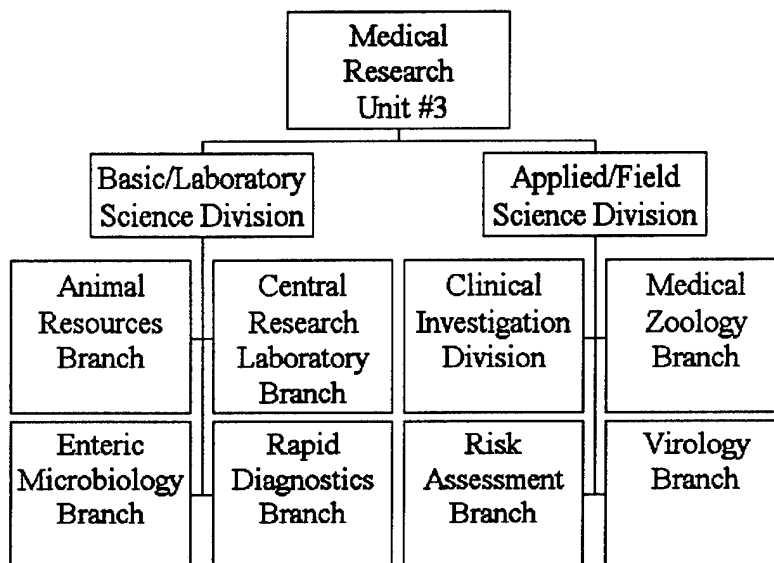
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	20	9	3	8
CIVILIAN	98	10	40	48
TOTAL	118	19	43	56

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	15.132	REAL PROPERTY	1.878
ADMIN	11.797	* NEW CAPITAL EQUIPMENT	0.000
OTHER	22.330	EQUIPMENT	1.989
TOTAL	49.259	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Medical Research Unit # 3

## Abbreviated Functional Chart - Technical Organizations



**Naval Medical Research Unit # 3**

Cairo, Egypt, 09835-0007  
(202) 284-1381

Commander: CAPT. Alfred J. Mateczun

**MISSION**

To conduct research, development, test and evaluation to enhance the health, safety, and readiness of Department of Defense personnel assigned to Southwest Asia and Africa in the performance of peacetime and contingency missions, and to perform other such functions as may be directed by higher authority.

Conduct research programs in infectious diseases (ID) which directly relate to military medical requirements and operational needs.

Conduct interactive ID research with the Navy and other DOD medical R&D laboratories, specifically in areas of preventive medicine, epidemiology and tropical medicine.

Develop and maintain capability to provide ID risk assessment information and conduct research and development to improve prevention, diagnosis, and treatment of ID in the Fleet and Fleet Marine Force.

Maintain a technology base and scientific and technical expertise in infectious disease and tropical medicine to provide advisory assistance when requested.

Provide or undertake such other appropriate functions as may be authorized or directed.

**CURRENT IMPORTANT PROGRAMS**

Continuing assessment of regional infectious diseases of epidemic potential, and/or likely to hamper military operations.

Assessment of the efficacy of current drug treatment regimens to treat diseases such as schistosomiasis, diarrheal diseases and meningitis.

Determine the range of genetic variability of HIV-1 stains isolated from subjects with a wide spectrum for different risk factors for HIV infection.

Develop a field test site for phase 3 trials of enterotoxigenic E. Coli vaccine and identify the pathogenic strains of ETEC responsible for epidemics of diarrheal disease in Egypt.

Conduct phase 3 trail of enterotoxigenic E. coli vaccine in Egyptian children and Northwest Europeans conducting Nile cruises.

Determine incidence of Rift Valley fever (RVF) in Egypt.

Characterize protective immune responses against Group B Meningococu.

Assess the threat of Hepatitis E infections to deployed U.S. forces in Theater of Operation.

Isolate and propagate Hepatitis E virus in culture.

Determine incidence of Campylobacter strains responsible for diarrheal diseases in deployed forces in Egypt.

Continue technology base capability to rapidly identify, formulate control strategies and assess the threat of high hazard viral disease threats to military operations.

Continue tech base capability for identifying and evaluating the threat of arthropod vectors which transmit militarily important diseases.



**EQUIPMENT/FACILITIES**

The equipment and resources at NAMRU-3 make it competitive with any major research laboratory in the United States.

**BIOMEDICAL RESEARCH SCIENCE BUILDING:**

6 story state-of-the-art design completed in 1983. Clinical and Applied Research Laboratory. 2,750 Sq. Ft P-3 level biohazard containment. Backup emergency generators and modern ventilation and waste disposal design.

**LIBRARY:**

Heavily used by local scientists/physicians. Subscription to over 75 scientific journals. Houses over 7,000 reference books. Interacts with Library of Medicine (Bethesda) via CD-ROM and computer link through USAID.

**SNAIL BREEDING LABORATORY:**

Produces over 1 million cercariae per day.

**INSECTARY:**

Supports colonies of disease vectors such as ticks, mosquitoes and sandflies.

**ANIMAL FACILITY:**

Directed by U.S. Army Veterinarian and enlisted (91T) Veterinary Technician. State-of-the-Art Barrier Facility for breeding inbred mouse strains, rodents, geese, sheep, baboons, etc.

**PUBLIC WORKS FACILITY:**

Directed by U.S.N. Civil Engineering Corps Officer. Engineering: Maintenance, construction, design, transportation (30 vehicles). Shops: Automotive, electrical, mechanical, sheet metal, carpentry, paint, plumbing.

**OTHER SUPPORT FACILITIES:**

Administration, Finance, Supply, Public Works, Pharmacy, Medical Equipment Repair, Safety, Occupational Health, Computer and Post Office.

**ACCESS TO ABBASSIA FEVER HOSPITAL:**

Largest MOH Infectious Disease Hospital (1,500 beds). Immediately adjacent to NAMRU-3. NAMRU-3 wards: FUO, Enteric Fever and Meningitis; Intensive Care Unit.

## Naval Medical Research Unit # 3

Cairo, Egypt, 09835-0007

(202) 284-1381

Commander: CAPT. Alfred J. Mateczun

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.323	0.047	0.370
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.759	0.000	0.759
6.3	0.481	0.000	0.481
Subtotal (S&T)	1.563	0.047	1.610
6.4	0.667	0.152	0.819
6.5	0.000	0.000	0.000
6.6	3.436	0.000	3.436
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	5.666	0.199	5.865
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.926	0.000	0.926
Other	0.438	0.000	0.438
TOTAL FUNDING	7.030	0.199	7.229

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	31	9	5	17
CIVILIAN	171	17	5	149
TOTAL	202	26	10	166

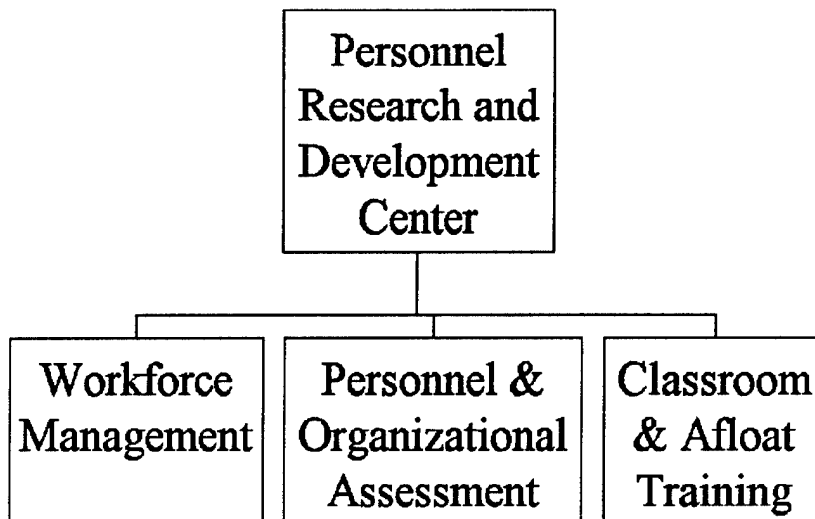
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	68.244	REAL PROPERTY	10.600
ADMIN	9.058	* NEW CAPITAL EQUIPMENT	0.000
OTHER	71.330	EQUIPMENT	5.763
TOTAL	148.632	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	4	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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## Navy Personnel Research and Development Center

## Abbreviated Functional Chart - Technical Organizations



**Navy Personnel Research and Development Center**  
San Diego, CA 92152-7250  
(619) 553-7812

CO: CAPT P. M. Spishock  
Technical Dir: Mr. Murray W. Rowe

### **MISSION**

NPRDC serves as the Navy's principal research laboratory for developing Manpower, Personnel and Training (MPT) technologies. We maintain and enhance fleet readiness by developing state-of-the-art technology solutions to significant operational problems in Workforce Management, Personnel and Organizational Assessment, and Classroom and Afloat Training. The Center's expertise also encompasses personnel surveys, multicultural and gender research, quality of life issues, productivity enhancement, and drug abuse research.

### **CURRENT IMPORTANT PROGRAMS**

**WORKFORCE MANAGEMENT** - A comprehensive program to improve the Navy's management of its personnel resources. Products include suites of integrated, computer-based models, databases and systems which enable: Rapidly collecting and displaying information on personnel force characteristics in easily understood graphic and tabular forms; Testing the effects of alternative policies on the workforce by mathematically simulating force dynamics under varying test policies; Developing and updating manning plans to reflect budgetary and end-strength constraints, and statistically forecasting losses and gains at several levels of detail within the enlisted and officer workforce.

Major projects include the Enlisted Strength Planning System, which enables monitoring all personnel force transactions on a daily basis; the Navy Training Reservation System (NTRS), designed to improve the way students are scheduled for Navy schools, while cutting time lost while students transition to and from schools; and Computer-Based Technology for Detailers, which (1) optimally matches rotating sailors to available jobs while considering moving costs, (2) meets sailors' location preferences, and (3) enables maximum use and reuse of individual skills.

**PERSONNEL AND ORGANIZATIONAL ASSESSMENT** - The goal of the overall research program is to enhance both personnel and organizational readiness. Efforts in Personnel Assessment address enlisted and officer selection, personnel testing, job classification, and performance measurement. The Center has a strong program to improve the sensitivity and effectiveness of computer adaptive testing in general. Innovative measurement technologies, including computer-based dynamic measures, are also being explored for their usefulness in personnel assessment.

Organizational Assessment investigates and develops organizational solutions to meet Navy goals. Research projects focus on organizational and workgroup behavior. Major projects involve personnel surveys and attitude assessment, multicultural and gender integration, the role of quality of life factors in relation to readiness, and technical innovations to enhance workgroup productivity.

**CURRENT IMPORTANT PROGRAMS**

**CLASSROOM AND AFLOAT TRAINING** - A broad training and education research program that incorporates advanced instructional and computer-based training technologies to create new and better ways to teach complex warfighting skills. The goals of this program are to reduce the costs of initial skills training as well as costs of maintaining highly perishable but infrequently practiced job skills.

This broad-based research program explores the use of multimedia technologies to develop automated classrooms, applications of video teletraining to deliver training worldwide, and the use of high fidelity simulations of complex physical systems to enhance training effectiveness.

One of the major programs involves the Interactive Multisensor Analysis Trainer (IMAT), which integrates two advanced technologies (instructional methodology and computer-based graphics systems) in a unique visual and dynamic environment. IMAT is currently designed to support the very complex, multi-domain operator and tactician tasks performed in Undersea Warfare.

The system uses models, databases and algorithms to accurately generate representations of real world oceans, threat submarine propulsion systems, sensor arrays, and systems not currently centrally managed. The trainer can create a full range of visual simulations suitable to apprentice through master training by controlling the complexity and variability of the visual scene.

Instructors who previously relied on teaching through complex equations can now let the student "see" physical interactions that previously existed only in scientific notation. The application of this technology creates a training system that is cost-effective to operate and which represents the interactions of complex variables in a more understandable format.

**EQUIPMENT/FACILITIES**

The Center occupies approximately 76,700 square feet of space in converted World War II barracks buildings. Much of this is configured to accommodate the social science and mathematical analysis tasks performed on microcomputers and minicomputers. The facilities include upgraded electrical capability and air conditioning of the most equipment-intensive rooms. In addition, there are two facilities which contain computer rooms with raised flooring, central air conditioning, and upgraded electrical power. These are:

**Manpower and Personnel Research Computing Facility (MAPCOM):**

This is a 2,000 square foot IBM 4381 mainframe computer facility used to develop, process, and maintain statistical and forecasting systems; very large, complex personnel and training databases, and large software system applications.

**Research Computing Facility (RCF):**

This is a 1,600 square foot Sun Systems facility, operating under the UNIX operating system. It provides network (internal and external) services, data analysis software, text processing support, graphics/video image processing software, and electronic mail/news services. The data analysis, text processing, and graphics/video image processing software is specialized and, in some cases, custom written for NPRDC applications. Some of the RCF services required modifications to the UNIX operating system kernel, necessitating an NPRDC source license for the UNIX operating system.

Navy Personnel Research and Development Center  
 San Diego, CA 92152-7250  
 (619) 553-7812

CO: CAPT P. M. Spishock  
 Technical Dir: Mr. Murray W. Rowe

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.188	NA	0.188
6.1 Other	0.070	0.010	0.080
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	2.361	1.572	3.933
6.3	4.108	6.230	10.338
<b>Subtotal (S&amp;T)</b>	<b>6.727</b>	<b>7.812</b>	<b>14.539</b>
6.4	0.278	0.397	0.675
6.5	0.591	0.526	1.117
6.6	0.542	1.114	1.656
6.7	0.204	0.061	0.265
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>8.342</b>	<b>9.910</b>	<b>18.252</b>
Procurement	0.168	0.543	0.711
Operations & Maintenance	3.615	6.158	9.773
Other	0.388	1.095	1.483
<b>TOTAL FUNDING</b>	<b>12.513</b>	<b>17.706</b>	<b>30.219</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	17	0	5	12
CIVILIAN	141	39	64	38
<b>TOTAL</b>	<b>158</b>	<b>39</b>	<b>69</b>	<b>50</b>

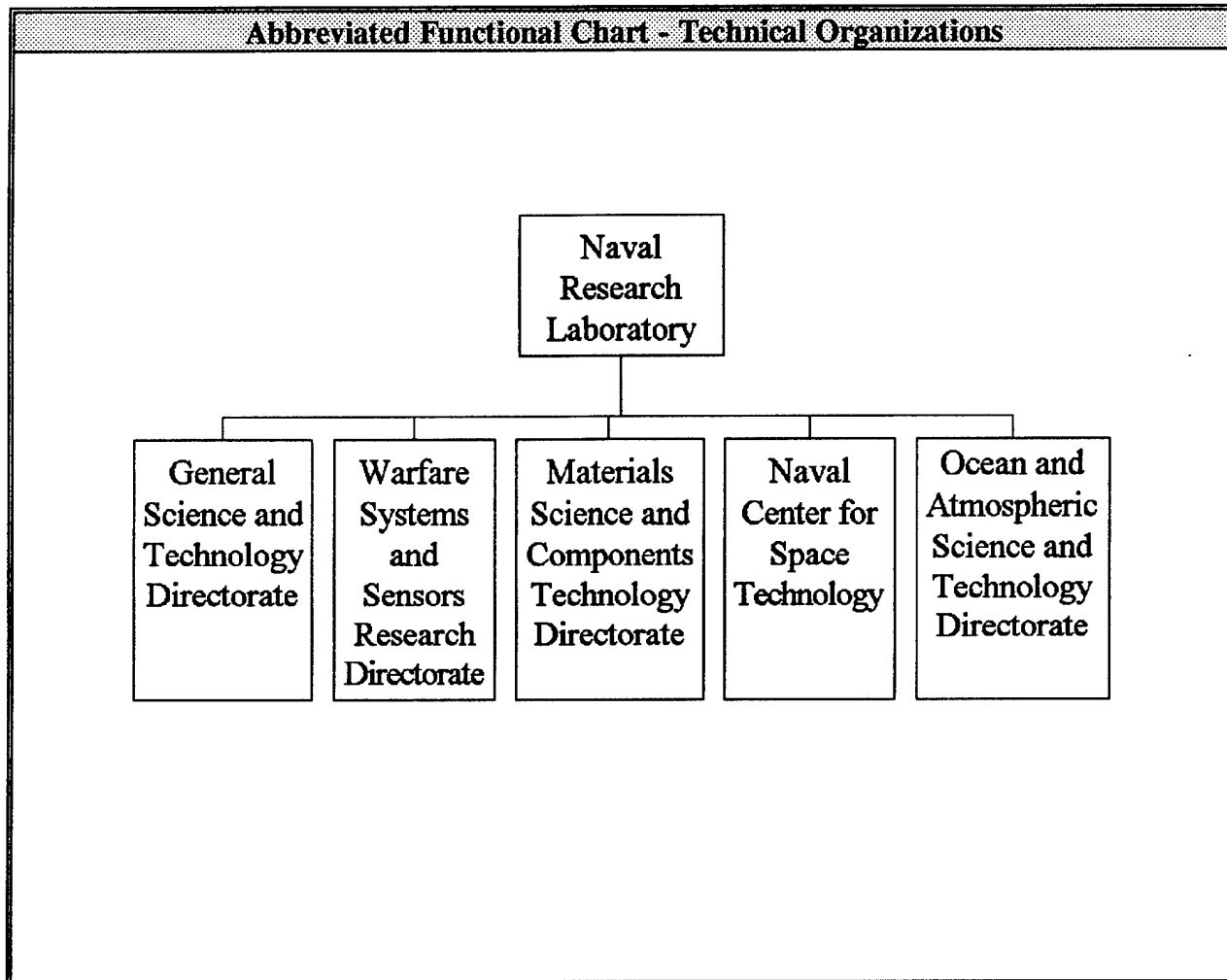
SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	55.800	<b>REAL PROPERTY</b>	1.170
ADMIN	16.400	* NEW CAPITAL EQUIPMENT	0.000
OTHER	4.500	<b>EQUIPMENT</b>	10.344
<b>TOTAL</b>	<b>76.700</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.176
ACRES	3	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable



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## Naval Research Laboratory



**Naval Research Laboratory**  
Washington, D.C. 20375-5320  
(202) 767-2541

Commanding Officer: CAPT R.M. Cassidy, Jr.  
Dir of Research: Timothy P. Coffey

### MISSION

Operate the Navy's full spectrum corporate laboratory to conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems and ocean, atmospheric, and space sciences and related technologies. In fulfillment of this mission, the Naval Research Laboratory:

- (1) Initiates and conducts scientific research of a basic and long-range nature in scientific areas of special interest to the Navy.
- (2) Conducts exploratory and advanced technological development deriving from or appropriate to the scientific program areas.
- (3) Within areas of technological expertise, develops prototype systems applicable to specific projects.
- (4) Performs scientific research and development for other naval commands and, where specifically qualified, for other agencies of the Department of Defense and, in defense-related efforts, for other Government agencies.
- (5) Upon request from appropriate naval commands, assumes responsibility as the Navy's principal R&D activity in areas of unique professional competence.
- (6) Serves as the lead Navy activity for mapping, charting, and geodesy (MC&G) research and development for the Defense Mapping Agency.

**LEADERSHIP AREAS:** NRL, the Navy's single, integrated corporate laboratory, provides the Navy with a broad foundation of in-house expertise from scientific through advanced development activity. Specific leadership responsibilities and expertise are maintained in the following areas:

- (1) Primary in-house research for the physical, engineering, space, and environmental sciences.
- (2) Broadly based exploratory and advanced development program in response to identified and anticipated Navy needs.
- (3) Broad multidisciplinary support to the Naval Warfare Centers.
- (4) Space and space systems technology, development, and support.

**CURRENT IMPORTANT PROGRAMS**

1. Advanced ECM and decoys for Navy EW systems.
2. Radars for countering the low cross-section sea-skimmer threat.
3. Fiber optic technology.
4. Biomolecular technology.
5. Tactical receiver equipment.
6. Advanced ESM & Specific Emitter Identification (SEI).
7. Electronic Devices.
8. Littoral/Coastal Dynamics.
9. Environmental Remote Sensing.

**Cooperative Research and Development Agreements (CRDAs):**

Airborne Fiber Doppler Sensor: Optical Air Data Systems, LP  
Carborane Siloxane Polymers: Loctite Corporation  
Case-Based Reasoning Research: Cognitive Systems, Inc.  
Development of UV Solid State Laser Materials: Lightning Optical Corporation  
Diamond CVD Plasma Reactor Development Program: 3M  
Diamond Materials Research: Diamond Microelectronics Corporation  
Hydrogen Maser Research: Hughes Space and Communications Company and IBM  
Lipid Microtubules as Drug Delivery Systems: Research Triangle Pharmaceuticals  
Marine Geophysical Systems: C&C Technologies, Inc.  
Microwave Application of Thin Film Ferroelectrics: Superconducting Core Technologies, Inc.  
Nested Cone X-Ray Collimator Development: Physitron, Inc.  
New Paint Formulations for Fluorinated Polyurethane: 21st Century Coating, Inc.  
Platelet Interaction and Efficacy Studies of LEH: UTHSC  
Poly(carborane/siloxane/acetylene)Resin for High-Temperature Radome Skin Applications: Texas Instruments, Inc.  
Robotics Research: Nomadic Technologies, Inc.  
SCI/ATM Bridge: Dolphin Interconnect Solutions, Inc. and Shipley Company  
SiGe Power Transistor Research: Westinghouse Electric Corporation  
Superconducting Microwave Filters: K&L Microwave Inc.  
Systematic Testing and Application of High Resolution Meteorological Modeling Research: KTAADN, Inc.  
The Efficacy of LEH Containing Fluorophospholipids: JP Laboratories, Inc., UMCP Technology Extension Service, and Virginia Center of Innovative Technology

**EQUIPMENT/FACILITIES****P-3 AIRCRAFT:**

NRL maintains five uniquely configured P-3 aircraft for research use. The aircraft are based at the NRL Flight Support Detachment, NAS Patuxent River, MD.

**MASSIVELY PARALLEL COMPUTATION FACILITY:**

This facility features two CM-5Es Thinking Machines, a 256 node CM-5E with 32 Cbytes of memory and a 32 node CM-5E with 4 Gbytes of memory. The 256 node CM-5E has a very large memory, high performance configuration (40 GFLOPS peak) permitting advanced research in all areas of

**EQUIPMENT/FACILITIES**

science. Examples of current efforts include molecular dynamics, fluid flow, meteorology, oceanography, signal processing, and database search. The facility has 150 Gbytes of secondary storage and 6.0 Tbytes of tertiary storage. Extensive graphics and visualization facilities are also available.

**CENTRAL TARGET SIMULATION FACILITY:**

The CTS facility is a high performance, hardware-in-the-loop simulator used for real-time test and evaluation of electronic warfare systems and techniques for countering the missile threat to the Navy.

**MASS SPECTROMETRY FACILITY:**

Principal research instruments include: Finnigan TSQ-70 triple quadrupole mass spectrometer equipped with particle bombardment, electrospray, thermal desorption, electron ionization and chemical ionization capabilities. Ion trapping experiments are conducted on a superconducting magnet Fourier transform mass spectrometer equipped with an Extrel Odyssey data system. Ions are usually formed by laser desorption (with a variety of lasers). Ions can be trapped and studied by activation or reactions with neutrals. A hybrid instrument consisting of conventional magnetic/electrostatic sectors and quadrupoles (VG/Fisons ZAB 2FQ) for use in the study of ion properties. Two time-of-flight mass spectrometers (using MALDI) for studies of large molecules; one of these instruments is equipped to study ion-surface collisions. Conventional gas chromatograph/ mass spectrometers include a quadrupole based system (Hewlett-Packard 5988) and an ion trap based system (Finnigan ITS-40). An additional ion trap system (Varian Saturn III) is being used in the development of membrane introduction techniques for water analysis.

**FIRE RESEARCH PLATFORM (MOBILE, AL):**

EX-USS Shadwell (LSD15) has an overall length of 457 ft. and a beam of 72 ft. As a test bed, the ship contains one pressure zone to study smoke management, including a collective protection system that has been created on all levels forward of frame 35. Selected ship systems that are important to fire protection and damage control have been reactivated, such as ventilation, electrical power, fluid distribution, fire mains, fire pumps, and internal communications.

**GAMBLE II FACILITY:**

Produces high-voltage (3 MV), high-current ( $> 1$  MA), short ( $< 100$  ns) pulses of energy of either positive or negative polarity. These terawatt (TW) power level pulses can be applied directly across a load (such as a gas column or wire) or can be used to produce powerful electron or ion beams. These high-power beams are then allowed to interact with x-ray converters or to propagate to a variety of targets. The facility is surrounded by thick concrete shielding to contain x-rays produced as a result of the high-power pulses. Diagnostics for the generator and the beams are monitored in a shielded room located outside the radiation area. Diagnostics include sophisticated computer-controlled transient recorders or oscilloscopes to record analog signals, numerous optical, x-ray or neutron diagnostics, and nuclear activation monitors.

**NANOELECTRONICS PROCESSING FACILITY:**

The NPF maintains a tool base of state-of-the-art processing equipment for micrometer and nanometer device and structure fabrication. There is a strong emphasis on computer-aided design and lithography utilizing an e-beam lithography system with a 10-nanometer spot size. To transfer patterns of these dimensions into a variety of metal, semiconductor or insulator materials, two reactive

**EQUIPMENT/FACILITIES**

ion etchers are used. Ultra-violet and deep ultra-violet photolithographic equipment is available. Ultra-clean oxidation and polysilicon deposition furnaces are used to create high purity, low defect films. Low pressure chemical vapor deposition is also available for silicon oxide and nitride films. A number of different metal films can be deposited with high vacuum evaporation and sputtering equipment. A complete bonding and packaging capability exists within the NPF for all types of device mounting.

**MOLECULAR BEAM EPITAXY (MBE) OF III-V SEMICONDUCTORS:**

Five MBE reactors are dedicated to the growth of Group IV, Group II-VI and Group III-V semiconductors. All reactors are equipped to perform in-situ surface and grown material analysis and have separate sample preparation and introduction chambers. For one of the III-V based semiconductor reactors two surface science chambers that permit in-vacuo transfer of epitaxial layers are available for growth studies. In the first chamber, an angle resolved electron spectrometer is used to determine the structure and chemical identity of the epitaxial layers near the film surface. In the second chamber, a scanning tunneling microscope and atomic force microscope are employed to determine surface morphology and film growth mode. There are also two analysis chambers for the Group IV semiconductor MBE system. The first chamber is a surface analysis laboratory with XPS, UPS, AES and SIMS while the second chamber has a LEED and a substrate heating stage.

**ACOUSTIC HOLOGRAPHY POOL FACILITY:**

The Acoustic Holography Pool Facility is a core research capability for in-water acoustics studies. The steel cylindrical tank is 55 feet in diameter, 50 feet deep, and contains 800,000 gallons of deionized water. The entire tank is vibration and temperature isolated. This unique laboratory is also instrumented with precise measurement systems, which include large workspace in-water robotic scanners capable of generating nearfield acoustic holography radiation and scattering database. A number of post-processing algorithms are available to convert these databases into a variety of outputs including farfield target strength, images of the vibrating structure's normal velocity, structure-borne wave dispersion curves, and supersonic intensity. This facility is complemented by its "sister" pool similarly instrumented and directly linked which has a sandy sub grade for bottom interaction studies.

**THERMAL HIGH-VACUUM CHAMBERS:**

Three test chambers comprise an environmental testing complex designed to create and maintain high-vacuum and/or thermal conditions. The complex is completely self-contained, but does require utilities inputs and an adequate supply of liquid and gaseous nitrogen. The facility includes a chamber room, machinery room, and a 26,000-gal liquid nitrogen storage facility. The complex may be controlled automatically or manually.

**SPACECRAFT TEST FACILITY:**

A facility in which space hardware fabricated at NRL and by outside vendors is tested and qualified for flight by providing the following environments: Random Vibration, Sinusoidal, and Shock testing with capability to 35,000 pounds and 200 data acquisition channels; Thermal Vacuum Testing with capabilities up to 16 feet diameter and 30 feet long; Acoustic/Vibration Reverberation Testing with 30,000 pound and 10,000 cubic foot capability; Modal Testing; Static Loads Testing; Mechanisms and Deployment Testing, and Mass Properties Testing with 18,000 pound spin balance capability.

Naval Research Laboratory  
Washington, D.C. 20375-5320  
(202) 767-2541

Commanding Officer: CAPT R.M. Cassidy, Jr.  
Dir of Research: Timothy P. Coffey

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	94.000	8.200	102.200
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	67.600	70.400	138.000
6.3	76.000	114.000	190.000
Subtotal (S&T)	237.600	192.600	430.200
6.4	13.300	19.800	33.100
6.5	19.200	28.700	47.900
6.6	2.700	8.100	10.800
6.7	9.800	29.600	39.400
Non-DOD	6.100	18.200	24.300
TOTAL RDT&E	288.700	297.000	585.700
Procurement	10.900	92.200	103.100
Operations & Maintenance	22.200	9.500	31.700
Other	22.800	3.600	26.400
TOTAL FUNDING	344.600	402.300	746.900

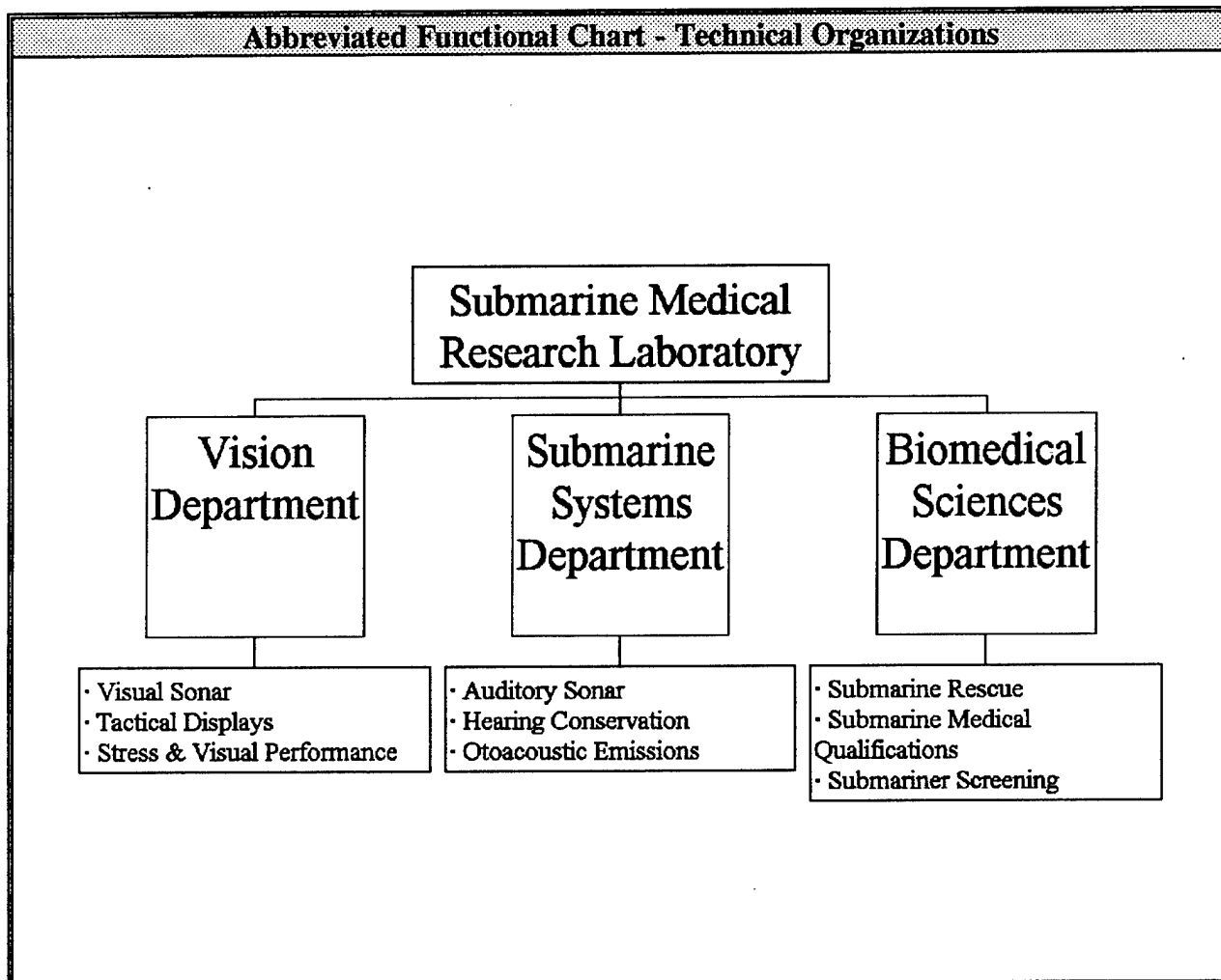
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	199	8	38	153
CIVILIAN	3,356	840	902	1,614
TOTAL	3,555	848	940	1,767

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	3,190.418	REAL PROPERTY	189.000
ADMIN	225.812	* NEW CAPITAL EQUIPMENT	0.455
OTHER	422.367	EQUIPMENT	369.000
TOTAL	3,838.597	* NEW SCIENTIFIC & ENG. EQUIP.	25.000
ACRES	556	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Submarine Medical Research Laboratory





**Naval Submarine Medical Research Laboratory**  
Groton, CT 06349-5900  
(860) 449-3263

CO: CAPT R. G. Walter, DC  
Exec. Off.: LCDR C. E. Puckett, MSC

### **MISSION**

Provide timely, high quality Research and Development to the Submarine force to enhance auditory and visual sonar operator performance, submariner health and physical standards, closed environment atmospheric monitoring, submarine escape and rescue, and hearing conservation both in air and under the sea.

### **CURRENT IMPORTANT PROGRAMS**

Medical problems associated with pressurized submarine rescue; reduction of attrition rates for submariners by better screening; improved performance on auditory, digital, and visual sonars; physiological performance effects of altered submarine atmospheres; hearing conservation; evoked otoacoustic emissions; tactical displays.

Sonar Display Enhancements - including development of headsets, and analog and digital signal processing techniques to maximize the intelligent, efficient use of man's visual and auditory systems.

Submarine Escape and Rescue - developing decision guidelines for survivors based upon physiological, engineering and operational factors, and providing guidance to operational commanders in establishing procedures and equipment for escape and rescue.

Submarine Clinical Issues - reducing the loss of talented personnel by instituting databased decisions on Submarine Disqualifications/Waivers for conditions of kidney stones and asthma.

Hearing Conservation - developing guidelines for diver safe exposure limits to underwater noise from tools and sonars; exploring the use of evoked otoacoustic emissions to detect the early stages of hearing loss.

Tactical Displays - providing ways to enhance operator performance by applying knowledge of the human sensory systems, specifically using color, symbology, highlighting cues, orientation, and default presentations.

Psychiatric Screening of all enlisted and officer submarine candidates undergoing training at Basic Enlisted Submarine School and Submarine Officers Basic Course.

Submarine Atmospheres - develop and maintain a database of submarine atmosphere constituents from varied data sources, answer such health questions as arise from data, and recommend better submarine atmospheric monitoring and control.

Submariner Mortality - epidemiological study of mortality rates for various causes of death in submariners compared to mortality in the general male population.

**EQUIPMENT/FACILITIES**

NSMRL maintains laboratory facilities for use of up-to-date equipment and instruments to perform basic and applied research. Facilities include: two-man rated 300 and 150 PSIG hyperbaric chambers; complete exercise physiology lab; instrumentation shop; technical library; graphic arts and photography shop; anechoic chambers; psychoacoustical lab; operational sonar simulation labs; mass spectrometers, gas chromatograph. Descriptions and functions of key equipment/facilities follow.

1. The multi-man, dual lock hyperbaric chamber has been certified as an audiometric test facility. This quiet chamber is essential to electro-acoustic and psycho-acoustic research on the development of hearing conservation standards for diving operations. This test chamber also has the capacity to be altered to perform hypobaric operations.

2. A large reverberation room is used for submarine habitability studies. Up to ten men may be housed within the room while being exposed to noise conditions. This facility is currently dedicated to the establishment of acoustic habitability standards for submarines and surface vessels using powerful low frequency sonar.

3. A large anechoic chamber is used for studies of the ear in free-field conditions. This facility is used to make controlled measurements of the characteristics of the ear in order to develop models of the ear for spatial localization and synthesized localized three dimensional sounds (virtual reality). This facility is also required to explore the feasibility of free-field listening techniques for sonar operator displays.

4. The experimental vision/perception laboratory includes photometric/spectroradiometric/optical bench equipment. No other DOD laboratory has developed a research thrust aimed at analyzing the visual display characteristics of sonar reception most compatible with the human operator.

5. A specialized, computer-automated psychoacoustics laboratory is used for experiments on sonar operator performance. This facility can test four men at a time using advanced sonar target presentation techniques.

6. A sonar simulation facility is used for advanced studies of active and passive sonar operator performance using "real-life" or simulated sonar contacts.

7. Additional specialized laboratory facilities, allow for research in the areas of biochemistry, gas chromatography/mass spectrometry and pulmonary physiology. These facilities, while not unique within DON or DOD, are essential in that they are dedicated to the specialized operational problems of submarine environments and crew health and safety considerations.

Naval Submarine Medical Research Laboratory  
Groton, CT 06349-5900  
(860) 449-3263

CO: CAPT R. G. Walter, DC  
Exec. Off.: LCDR C. E. Puckett, MSC

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.664	NA	0.664
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	0.000	0.000	0.000
6.3	1.147	0.000	1.147
<b>Subtotal (S&amp;T)</b>	<b>1.811</b>	<b>0.000</b>	<b>1.811</b>
6.4	0.110	0.000	0.110
6.5	0.000	0.000	0.000
6.6	0.554	0.000	0.554
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>2.475</b>	<b>0.000</b>	<b>2.475</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.770	0.000	0.770
Other	0.847	0.000	0.847
<b>TOTAL FUNDING</b>	<b>4.092</b>	<b>0.000</b>	<b>4.092</b>

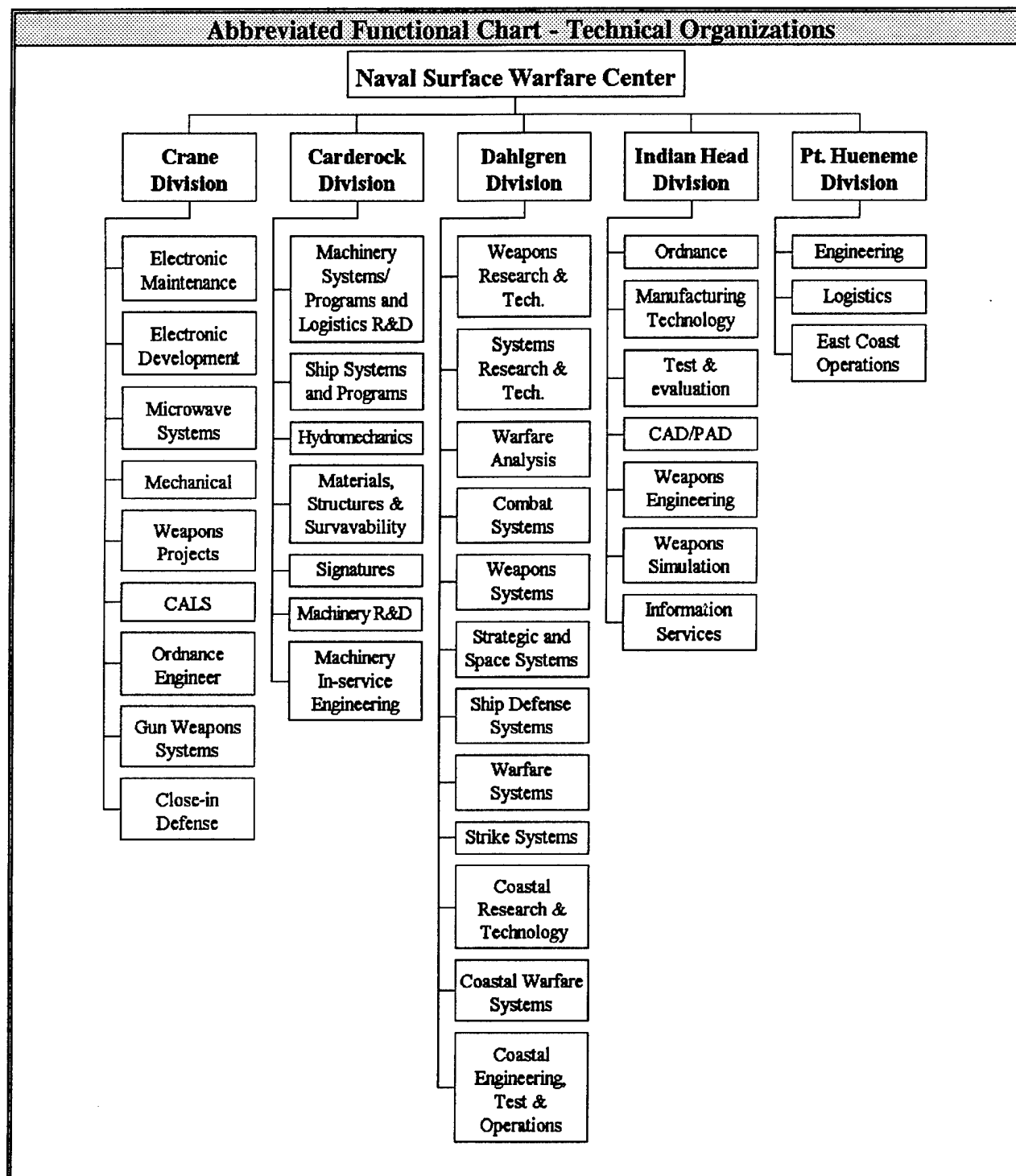
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	20	6	0	14
CIVILIAN	33	8	5	20
<b>TOTAL</b>	<b>53</b>	<b>14</b>	<b>5</b>	<b>34</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	44.783	REAL PROPERTY	7.657
ADMIN	6.233	* NEW CAPITAL EQUIPMENT	0.843
OTHER	4.962	EQUIPMENT	4.452
<b>TOTAL</b>	<b>55.978</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.263
ACRES	0	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Surface Warfare Center



Naval Surface Warfare Center  
Arlington, VA 22242-5160  
(703) 602-0632

Commander: RADM D.P. Sargent, Jr.  
Technical Dir.: Dr. Ira Blatstein

### MISSION

Operate the Navy's full spectrum RDT&E, engineering and fleet support center for ship hull, mechanical and electrical systems, surface ship combat systems, coastal warfare systems, and other offensive and defensive systems associated with surface warfare.

### CURRENT IMPORTANT PROGRAMS

Propulsion machinery systems and components test, evaluation and in-service engineering; Hull, mechanical and electrical (HM&E) auxiliary machinery systems and components test and evaluation and in-service engineering; HM&E electrical machinery systems and components test and evaluation and in-service engineering; Hull and deck machinery systems components test and evaluation and in-service engineering; Surface warfare modeling and analysis; Ship vulnerability and survivability; Surface and undersea vehicle hull machinery, propulsors and equipment; Platform systems integration AEGIS combat system; Ship self-defense, including the self-defense test ship; Cruise weapon systems-Tomahawk and Harpoon; Gun weapon systems; Standard missile; Continuous processing of composite propellants (an international cooperative R&D agreement to develop processing); Ordnance environmental R&D of energetics processing technologies; Gun propulsion R&D for the Navy's Electrothermal Chemical (ET-C) gun and Range Enhancement Near-Term (RENT) programs; Tri-service RDT&E, engineering, manufacturing, and fleet support for cartridges, cartridge and propellant actuated devices, and aircrew escape propulsion systems; RDT&E for Navy and Marine Corps Mine Countermeasures (MCM) including: distributed explosives technology, demonstrative/advanced countermeasure system, surf zone MCM, and shallow water MCM; Gun weapon system replacement program; MK 15 Phalanx close-in weapon system overhaul project; MK 45 gun engineering project; 76mm MK 75 program and life cycle support; SLQ-32 electronic countermeasures systems; Miniature/microminiature electronic repair; Precise integrated navigation systems (PINS) ISEA/ILS/DOP; AN/SYQ-13 navigation systems; Trident; Submarine Launched Ballistic Missile (SLBM) targeting; Unmanned Aerial Vehicle (UAV); Ship self-defense systems; Vertical Launch System (VLS); Gun ammunition; Mines; Warheads; ASW systems; EW systems; AEGIS radar, search and track; EM effects; Magnetic silencing; Chemical and biological defense; Ship/airborne mine CM combat system integration; Diving and life support; Special warfare; Amphibious warfare.

Cooperative Research and Development Agreements (CRADAs):

#### Dahlgren Division:

1. Development of new software products based on NSWCCD supersonic airflow programs.
2. Development of titanium piping (including galvanic isolation and seawater treatment technology) to prevent corrosion, erosion, and blockage due to marine growth in cooling and seawater piping systems aboard surface ships.
3. Collaboration to investigate material processing aspects and the electronic properties of narrow

**CURRENT IMPORTANT PROGRAMS**

bandgap semiconductors.

4. Development of a new and improved launcher for the Shoulder-launched Multi-purpose Assault Weapon (SMAW).
5. Research and development of non-thermal plasma discharges as an alternative method for the abatement of hazardous gases.
6. Research and development contributing to the understanding of high voltage connector technology in low inductance environments.
7. Amphibious, Marine Corps, and Mine Warfare C4I.
8. Joint cooperation on the Mobile Underwater Debris Survey System (MUDSS).
9. Evaluation of environmental remediation sensors.

**Carderock Division:**

1. Use of spinning microfilters to separate oil from water for abatement of marine oil spills.
2. Technical assistance to the University of Maryland's Technology Extension Service.
3. Ben Franklin Technology Center (BFTC).
4. NAVATEK II Model Tests.
5. Pennsylvania Energy Office.
6. Recycling of Navy Ship Plastic Waste into Marine Pilings.

**Crane Division:**

1. Southern Indiana Development Commission (SIDC).
2. Conversion of Rockeye Bomblets to Commercial Mining Applications.
3. Validation of a High Pressure Washout System for Military Projectiles.
4. Heat Transfer and Finite Element Analysis of the ATLAS Barrel Composite Module Shell.

**Indian Head Division:**

1. Applied Research Relating to Injection Loading Machine technology.
2. Environmentally Safe Demilitarization Technologies for Conventional Ammunition.
3. Applied Research into Composite Air Bag Propellants.
4. Technical Assistance to the University of Maryland's Technology Extension Service.
5. Application of Radiation Processing Technologies to the Manufacture and Demilitarization of Energetic Materials.
6. Applied Research into Instructional and Information Exchange Technologies.
7. Applied Research into Laser Initiated Explosive Subsystems.
8. Advanced Modular Arm-Fire Device for Multiple Applications.

**EQUIPMENT/FACILITIES****Dahlgren Site:**

Wind tunnel complex with capability to MACH 18. 25-mile Potomac River range for testing guns, ammunition, and integrated shipboard sensors. Disk pack facility for SLBM fire control systems and targeting. SLBM retargeting facility. Product assurance and simulation facilities for surface ship combat systems. AEGIS computer facility. Magnetic silencing facility. Ocean and harbor ranges. 1.75-million gallon hydroballistic tank. Mine tank and sensor facilities for testing mines and

**EQUIPMENT/FACILITIES**

underwater systems, explosives and warheads. Materials research facilities. Chemical/biological defense laboratory. Nuclear effects facility. General purpose laboratories. Compartmented laboratory.

**Dahlgren Coastal Systems Station:**

Expeditionary Warfare modeling and simulation. Mines and mine countermeasures equipment and systems. Specialized mine warfare transducers and active/passive sonar modeling for MCM. Special Warfare mission equipment. Ocean simulation to 2,250 ft. depth. Diving and Life Support systems development and test. Gas Analysis. Fleet diving support complex. Gulf test range. Magnetic target detection and classification range. Mine exploitation complex. Pier space. Boats, heliport complex with equipment.

**Crane:**

Overwater radio frequency (RF) test range. Surveillance radar overhaul facility. Special equipment and computers for microelectronics technology. Electron linear accelerator. Materials analysis instrumentation. State-of-the-art CAD/CAE modeling and simulation tools and automated test equipment which accommodate any range of circuit card technology. Thick film circuit card manufacturing laboratory.

**Carderock Philadelphia Site:**

Full-scale IPMP (SSN-21) steam propulsion land based test site. Full-scale LSD-41 diesel propulsion land based test site. Full-scale DDG-51 gas turbine land based test site. Full-scale electric drive/machinery module land based test site. Full-scale gear meteorology and calibration lab. Full-scale air compressor test site. Full-scale submarine life support test site. Full-scale submarine generator test site. Full-scale submarine ship service generator test site. Fire, pollution, marine equipment lab. Full-scale conveyor and elevator test complex. Full-scale submarine mast bending test facility. Full-scale submarine periscope/antenna test sites. Full scale submarine buoy communication test site. Chemistry and metallurgy lab. Full-scale gravimetric flow calibration lab. Test operations. Analysis and control center. Full-scale steam propulsion testing complex.

**Carderock Division - Patuxent River, MD:** Special trials unit; surface effects test ship.

**Carderock Division - Memphis, TN:** Large Cavitation Channel (LCC).

**Carderock Bethesda Site:**

Simulation, planning and analysis research center. Explosives test pond. Data and image processing systems. David Taylor Model Basin complex. Maneuvering and seakeeping basin. Rotating arm basin. Radio-controlled model facility. Circulating water channel. 24-inch and 36-inch cavitation channels. Dynamic control system simulator. 140-foot towing basin. Hydrodynamic/hydroacoustic technical center. Deep submergence pressure tanks. Structural evaluation lab. Wind tunnels.

**Carderock Annapolis Site:**

Fire research and air contamination facility. Machinery systems silencing lab. Acoustics materials lab. Magnetic fields lab. Low observable materials lab. Advanced electrical machining. Technology and development facility. Submarine fluid dynamics facility. Electric power tech lab. Metallic materials and processing facility. Marine composites lab. Marine coatings and corrosion control facility. Marine tribology lab. Deep ocean pressure simulation facility. Shipboard environmental

**EQUIPMENT/FACILITIES**

protection facility.

**Carderock Division - Portsmouth, VA:** Shock trials instrumentation.

**Carderock Division - Bayview, ID:** Acoustic research detachment.

**Carderock Division - Santa Cruz, CA:** Acoustic range facility, radar imaging facility.

**Carderock Division - Bremerton, WA:** Carr Inlet test facility.

**Carderock Division - Ketchikan, AK:** Southeast Alaska facility.

**Carderock Division - Panama City, FL:** *Lauren & Athena* research vessels/ship systems.

**Carderock Division - Cape Canaveral, FL:** Research Vessel *Hayes*.

**Carderock Division - Norfolk, VA:** Combatant craft engineering detachment.

**Indian Head:**

Continuous processing facility. Composite case/component overbraiding facility. Synthesis and scale-up facilities for all types of energetic materials. Test facilities. Surface Warfare Engineering Facility. Electrostatic Discharge (ESD) facility.

**Port Hueneme Division, Port Hueneme, CA:** Surface Warfare Engineering Facility.

**Port Hueneme Division, San Diego, CA:** Integrated Combat Systems Test Facility (ICSTF).

**Port Hueneme Division, Dam Neck, VA:** Software program generation and life-cycle maintenance laboratories.



Naval Surface Warfare Center  
Arlington, VA 22242-5160  
(703) 602-0632

Commander: RADM D.P. Sargent, Jr.  
Technical Dir.: Dr. Ira Blatstein

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	5.600	NA	5.600
6.1 Other	2.400	1.500	3.900
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	74.000	68.900	142.900
6.3	40.600	43.100	83.700
Subtotal (S&T)	122.600	113.500	236.100
6.4	191.200	199.500	390.700
6.5	55.300	57.900	113.200
6.6	33.200	30.100	63.300
6.7	21.300	23.400	44.700
Non-DOD	27.300	85.900	113.200
<b>TOTAL RDT&amp;E</b>	<b>450.900</b>	<b>510.300</b>	<b>961.200</b>
Procurement	461.300	255.400	716.700
Operations & Maintenance	402.700	230.600	633.300
Other	427.500	149.400	576.900
<b>TOTAL FUNDING</b>	<b>1,742.400</b>	<b>1,145.700</b>	<b>2,888.100</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

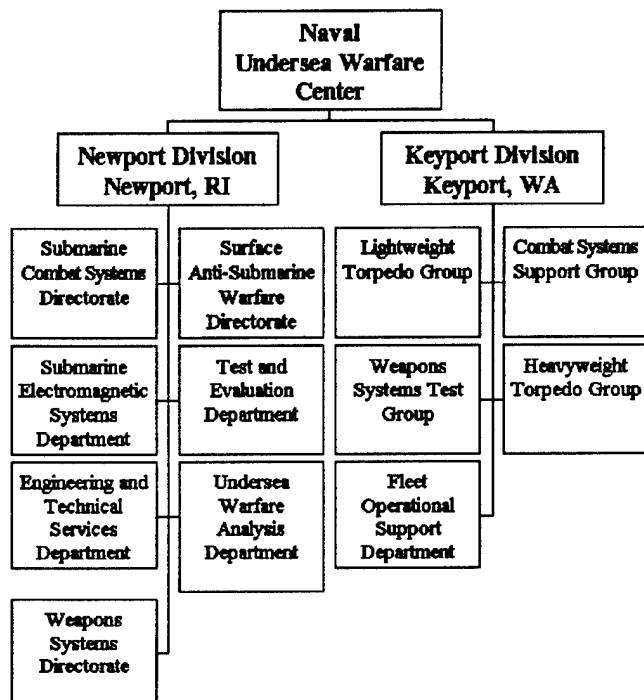
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	417	0	80	337
CIVILIAN	18,420	371	7,366	10,683
<b>TOTAL</b>	<b>18,837</b>	<b>371</b>	<b>7,446</b>	<b>11,020</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	6,444.000	REAL PROPERTY	1,295.000
ADMIN	1,669.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	11,981.000	EQUIPMENT	1,631.000
<b>TOTAL</b>	<b>20,094.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	11.600
ACRES	72,523	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Naval Undersea Warfare Center

## Abbreviated Functional Chart - Technical Organizations



**Naval Undersea Warfare Center**  
Newport, RI 02841-1708  
(401) 841-6761

**Commander: RADM John F. Shipway**  
**Technical Dir.: Dr. John E. Sirmalis**

### **MISSION**

Operate the Navy's full-spectrum RDT&E, engineering, and fleet support center for submarines, autonomous underwater systems, and offensive and defensive weapon systems associated with undersea warfare.

### **CURRENT IMPORTANT PROGRAMS**

#### **SUBMARINE COMBAT AND COMBAT CONTROL SYSTEMS:**

NSSN Levels II and III - Technical Direction Agent (TDA); SFMPL/DTC - DA, TDA, ISEA; AN/BSY-2, AN/BQG-5 Submarine Combat Systems - TDA; TRIDENT Systems TDA, ISEA; Combat Control System Improvement - Lead Lab; AN/BSY-1(V) Program TDA, ISEA; Combat Control Technical Program BLOCK Program Manager; SSN-21 Combat System Development - TDA; CCS Mk 1/Mk 2/Mk 117 TDA, ISEA; Shipboard Test Programs - TDA; Weapons Systems Accuracy Trials (WSAT) - TDA; System Consolidated Operability Tests - TDA; TRIDENT Systems Refurbishment and Module Repair Depot; AN/BSY-1(V) Program Refurbishment, Upgrade and Module Repair Depot; CCS Mk 1/Mk 2/Mk 117 - Refurbishment, Upgrade and Module Repair Depot and Trusted Agent; Poseidon Combat Control System ISEA, TDA, DA, Refurbishment Depot, and Module Repair Depot; Mk 309, Mk 111, and Mk 114 ISEA and Refurbishment and Repair Depot; Combat System Ship Qualification Trials (CSSQT)

#### **SUBMARINE ELECTRONIC WARFARE:**

Submarine Electronic Warfare Systems - TDA; Special Electronic Warfare Support Measurement Sensors - TDA

#### **SUBMARINE ELECTROMAGNETIC, ELECTRO-OPTIC, AND NONACOUSTIC EFFECTS RECONNAISSANCE, SEARCH, AND TRACK SYSTEMS:**

Periscope Development and Support - TDA; Electro-Optics/Fiber-Optics - Lead Lab; Nonacoustic Technology and Sensor Systems - TDA

#### **SUBMARINE-LAUNCHED WEAPON SYSTEMS:**

Tomahawk Cruise Missile/Sub Integration - SIA, ISEA, AEA; Design Cognizance and In-service Engineering for Submarine Torpedo Tubes and Ejection Systems - ISEA, DA; Encapsulated Harpoon Weapon System-DA, SIA, AEA, and ISEA; SSN-688 Class Vertical Launch System In-service Fleet Support - ISEA, AEA; Submarine Stowage and Launch System for SSN-21 & NSSN; Submarine 3-inch Launching System - ISEA; Submarine Weapons Stowage and Handling Equipment - ISEA; Submarine-Launched Mobile Mine Production and Depot Support

#### **SUBMARINE-UNIQUE ONBOARD COMMUNICATIONS SYSTEMS AND COMMUNICATIONS NODES:**

**CURRENT IMPORTANT PROGRAMS**

Submarine Integrated Antenna Systems - TDA; Navy Extremely High Frequency Satellite Communications Program - TDA; Submarine Communications Systems - TDA; AN/BST-1 and Clarinet Merlin ISEA; AN/BRA-6 ISEA

**SUBMARINE VULNERABILITY AND SURVIVABILITY:**

Acoustic Intercept Receiver Improvement Program; Fleet Operations Support; Arctic Operations/ICEX

**SURFACE SHIP AND SUBMARINE SONAR SYSTEMS:**

AN/SQQ-89 Basic (TDA), Module Repair Depot and Trusted agent; Surface (ASW) Advanced Development Lead Lab; Submarine Sonar Advanced Development Lead Lab; AN/BQQ-5 and AN/BQQ6 Submarine Sonar Programs - TDA, ISEA; Upgrade/Refurbish Depot, Module Repair Depot and Trusted Agent; Surface Ship Acoustic Analysis Lead Lab; Submarine Ancillary Sonar Systems - TDA; In-service Surface Ship Sonar/Fire Control Systems; Lightweight (Fiber Optic) Planar Array ATD - Lead Lab; Multiline Towed Array ATD - Lead Lab; Acoustic Performance Prediction Program - TDA; High Gain Multidimensional Towed Arrays BLOCK Program Manager; AN/SQQ-34(V) -ISEA, SSA and Module Repair; Submarine Towed Systems - TDA, ISEA; Sonar Trainers - TDA, ISEA; AN/SQQ-89 Basic Module Repair Depot and Trusted Agent; AN/BQQ5 and AN/BQQ6 ISEA, Upgrade/Refurbish Depot, Module Repair Depot, and Trusted Agent; AN/BQR-15, AN/BQR-19, AN/BQR-21, AN/BQQ-9, AN/BQR-T4 ISEA, DA, AND TDA; CVASWM (AN/SQQ-34(V)) ISEA, AEA, DA, and SSA Mod 4.2, 4.3 Acoustic System Upgrade, Module Test and Repair; PMS 425 Towed Systems ISEA; Sonar Trainers ISEA, AEA, DA; Post-Operational Analysis Critique and Exercise Review (PACER)

**TORPEDOES AND TORPEDO COUNTERMEASURES:**

Torpedo Mk 48/Mk48 ADCAP TDA, DA, AEA, ISEA; Torpedo and Electric Propulsion S&T lead lab; Surface Ship Torpedo Defense TDA, ISEA and AEA; Torpedo MK-46 TDA, DA, AEA; Torpedo MK-50 TDA, DA, AEA; Torpedo FMS Program; MK 48 Torpedo - IMA, Depot Engineering Support, Test and Evaluation, and Fleet Analysis; MK 48 ADCAP Torpedo - IMA, Depot, Proofing, Test and Evaluation Support, Trusted Agent, and Fleet Analysis; MK 46 Torpedo - IMA, Depot, ISEA, Test and Evaluation and Fleet Analysis; MK 50 Torpedo - IMA, Depot, Trusted Agent, ISEA, Proofing, and Test and Evaluation Support

**UNDERSEA RANGES:**

Atlantic Undersea Test and Evaluation Center MRTFB Manager; NATO FORACS Range, Andros (NFA); Barking Sands Tactical Underwater Range Development - TDA; Australian Underwater Tracking Range - TDA; Southern California ASW Range - TDA; Range Technology Development; Portable Tracking System

**NORTHWEST RANGES:**

Dabob Bay Range - Operations and Maintenance; Nanoose Deep Water Tracking Range - Operations and Maintenance; Quinault Shallow Water Range Site; SOCAL/MIDPAC Range System; Hawaiian Island Underwater Range (HAIUR) Site; San Clemente Island Underwater Range Site (SCIUR); Fleet Operational Readiness Accuracy Check Site (FORACS); Air Operations Support (PACER); Surface Ship, Submarine, and T-AGOS-Class Ships Radiated Noise Measurement

**UNDERSEA VEHICLE ACTIVE AND PASSIVE SIGNATURES:**

Mobile ASW Target Mk 30 TDA; Advanced Test Vehicles - TDA; Expendable Mobile Acoustic

**CURRENT IMPORTANT PROGRAMS**

Torpedo Target (EMATT) - TDA

**UNDERSEA WARFARE MODELING AND ANALYSIS:**

Warfare Modeling Development/Validation; New Attack Submarine; Target Physics Modeling; Sonar Performance Modeling/Analysis

**COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA) AND PARTNER SUMMARY**

**CRADAs for NUWCDIVNPT:**

1. A simulation-based-design effort to improve design time and reduce cost: General Dynamics/EB
2. Investigate massively parallel processing applications for Sonar Processing: Lockheed Martin
3. Provide smart operator console and PC based data recording and reduction to improve electric vehicle performance: Connecticut Municipal Electric Energy Cooperative (CMEEC)
4. A non-invasive method to accomplish angiography: MedAcoustics, Inc.
5. An experiment to see the degree of interaction on a mutually interesting acoustic array: Institut Supérieur Electronique
6. Torpedo transducer use to probe the sub-bottom using a towed device: Precision Signal, Inc.
7. Cyclic power of waves used to generate electricity through magnetohydrodynamic forces: SARA, Inc.
8. Mutual development of computational fluid dynamics codes: General Dynamics
9. Feasibility of using Unmanned Underwater Vehicles (UUVs) as remote ocean mobile sensors: Florida Atlantic Univ.
10. Reduction of electromagnetic interference using submarine communications techniques: CMEED
11. Using independent UUVs to monitor oil spills and environmental impact: University of Massachusetts, Dartmouth. Advanced Technology Center
12. Fabrication and Testing of Nickel-Zinc Cell Batteries: Next Century Power
13. Mathematical model and verification of large nets in an ocean environment: University of Maine
14. Utilization of acoustics to find the liquid/solid levels in septic tanks: Worldstone
15. Investigate the single fiber towed array concept: AT&T

**CRADAs for NUWCDIVKPT:**

1. Refine the design, development and manufacture of small boat/mission module craft: TEAM ONE USA
2. Enhance the DIVKPT Environmental Management Information System (EMIS) to operate on a Windows-compatible desktop PC: Vitro Corporation
3. Development of head-mounted display system hardware and software for manufacturing, assembly, testing and operation of electronic and mechanical systems, assemblies and components: Virtual i/O, Inc.
4. Development of conversion kits for small, high-output internal combustion engines: 4-Cycle, Inc.

**EQUIPMENT/FACILITIES****NUWC Division, Newport, RI:**

Metrology and Mechanical Inspection Facility; Submarine and USW Combat Systems Technology Laboratory; Submarine Combat System Concept of Operations Test Bed Complex; Trident Life Cycle Support Facility (TLCSF); Launcher Complex; Acoustic Systems Engineering (ASE) Complex; Undersea Warfare Acoustic Signal Processing Facility; Heavyweight/Lightweight Tactical Torpedo Open Cycle Thermal Propulsion Test Facility; Lightweight Tactical Vehicle Closed Cycle Thermal Propulsion Test Facility; Superconducting Electromagnetic Thruster and Seawater Magnetohydrodynamics Test Facility; Torpedo and Countermeasure Technology Development Signal Processing Laboratory; Torpedo Countermeasure Integration Complex; Torpedo Life Cycle Support Facility Complex; Total Containment High Energy Propulsion System Test Chamber; Undersea Warfare System Hardware Prototyping and Industrial Services Facility; Undersea Weapons Environmental Engineering Facility; Underwater Vehicles Deep Depth Propulsion Test Facility; Tactical Scale Vehicle Acoustic Wind Tunnel; Narragansett Bay Shallow Water Test Facility; Shallow Water Diesel Submarine Target Facility; Undersea Warfare Test and Evaluation Analysis Facility; Tactical Scale Vehicle Reverberant Acoustic Test Facility (TSVRATF); Heavyweight Primary Battery Electric Propulsion Test Facility; Langley Tow Tank (LTT); Mobile Targets, Countermeasures, UUV, and Torpedo R&D Life Cycle Support Facility; Propulsion Noise Test System; Tactical Scale Vehicle Anechoic Chamber; Tactical Scale Vehicle Composite Materials Laboratory; Tactical Scale Vehicle Electric Propulsion Development Facility; Weapons Analysis Facility; Undersea Warfare Analysis Laboratory.

**NUWC Detachment, New London, CT:**

Trident/Seawolf Support Pier; Submarine Antenna Test Complex; Submarine Periscope Research & Development Test Facility; Submarine Electronic Support Measures (ESM) Test Bed; Advanced Submarine Communications Facility; Land-Based Submarine Radio Room; Sonar Array Microelectronics Development Facility; Sonar Equipment Prototyping and Shipboard Installation Facility; Acoustic Array Experimental Measurements Facility; Land-Based Integrated Test Site (LBITS); Sonar Development and Evaluation Complex; Submarine and Surface Ship Sonar Transducer Research Development and Evaluation Complex; Submarine Sonar Development and Evaluation Complex (SSDEC); Surface Ship Sonar In-Service Engineering Complex (SISEC); Tactical Sonar Measurements and Analysis Facility; Turbulent Boundary Layer Hydroacoustic Experimental Quiet Water Tunnel Facility; Underwater Mobile and Deployed Sonar Arrays Research, Development, and Evaluation Complex; Surface Ship Torpedo Defense (SSTD) Acoustic Facility.

**NUWC Detachment, Orlando, FL:**

Shock Tube Facility; Anechoic Tank Facility (ATF); Leesburg Facility (FEFAC); Low-Frequency Facility (LOFAC).

**NUWC Detachment, Dodge Pond, CT:**

Dodge Pond Acoustic Measurement Facility.

**NUWC Detachment, Andros Island, Bahamas:**

Atlantic Undersea Test and Evaluation Center (AUTEC); R/V NUWC Ranger; Towed Array Test and Evaluation Facility (West Palm Beach, FL).

**NUWC Detachment, Seneca Lake, NY:**

**EQUIPMENT/FACILITIES**

Seneca Lake Acoustic Measurement Facility.

**NUWC Division, Keyport, WA:**

Undersea Weapons Repair and Maintenance Depot; Undersea Weapon Evaluation Facility (UWEF); Range Information Display Center (RIDC); CV-ASW Module Laboratory; Pacific NW Range System; Torpedo Explosive Operating Complex; Torpedo Storage Magazines; Hardware Environmental Test Facility; Target MK 30 Depot and IMA; Range Tracking Pinger IMA; Shipboard Electronic Systems Evaluation Facilities (SESEF); Combat Systems Facilities; Transducer Automated Test Facility; Weapon Acceptance and Operational Test Facility; Underwater Noise Analysis Facility (UNAFAC); Light Industrial Support Facility; Industrial Waste Treatment Facility; Hazardous Waste Treatment, Storage, and Disposal Facility; Otto Fuel II Reclamation Plant; Lithium Decontamination Facility; Recycling Facility; Hyperbaric Chamber; Automated Material Handling Facility; Naval Undersea Museum; Range Launch, Recovery, and Target Craft; Range Display and Information Center.

**NUWC Detachment, Hawaii/SOCAL:**

Arctic Submarine Laboratory; MIDPAC Range System; SOCAL Range System; Target MK 30 and Range Tracking Pinger IMA; Target MK 30 and Range Tracking Pinger IMA; Shipboard Electronic Systems Evaluation Facility (SESEF); Post-operational Analysis Critique and Exercise Review (PACER) facility; Navy Mine Depot (Hawthorne, NV).

Naval Undersea Warfare Center  
Newport, RI 02841-1708  
(401) 841-6761

Commander: RADM John F. Shipway  
Technical Dir.: Dr. John E. Sirmalis

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	2.700	NA	2.700
6.1 Other	1.000	0.500	1.500
6.2 IED (Navy)	0.000	0.000	0.000
6.2 Other	19.400	10.700	30.100
6.3	4.300	2.500	6.800
Subtotal (S&T)	27.400	13.700	41.100
6.4	39.500	34.100	73.600
6.5	80.400	59.100	139.500
6.6	8.300	33.900	42.200
6.7	25.400	26.600	52.000
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	181.000	167.400	348.400
Procurement	148.800	234.300	383.100
Operations & Maintenance	109.300	98.900	208.200
Other	68.800	61.100	129.900
TOTAL FUNDING	507.900	561.700	1,069.600

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	285	1	49	235
CIVILIAN	6,077	164	2,806	3,107
TOTAL	6,362	165	2,855	3,342

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	2,876.000	REAL PROPERTY	273.300
ADMIN	279.000	* NEW CAPITAL EQUIPMENT	8.600
OTHER	2,878.000	EQUIPMENT	678.900
TOTAL	6,033.000	* NEW SCIENTIFIC & ENG. EQUIP.	41.300
ACRES	2,543	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable



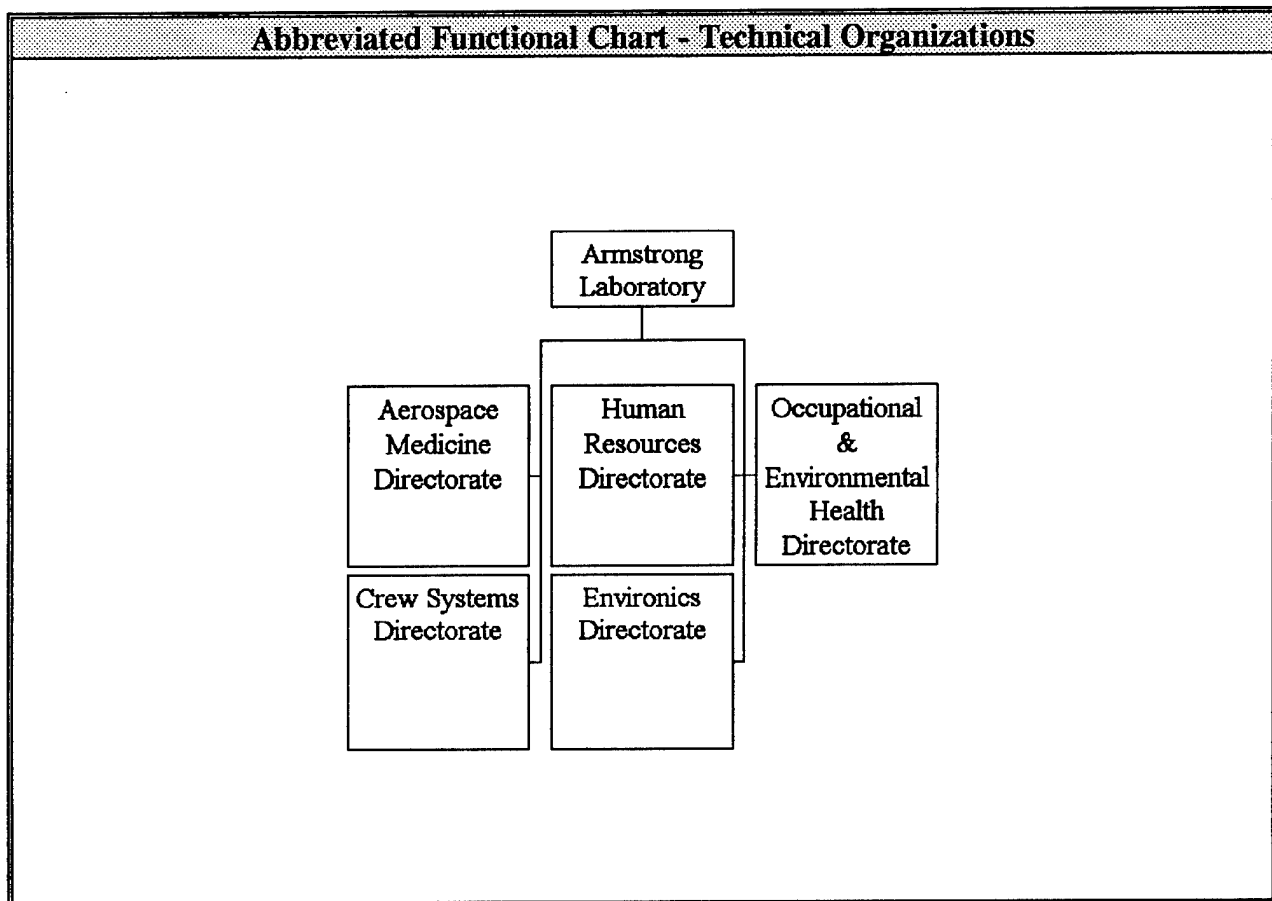
# **DEPARTMENT OF THE AIR FORCE**

**DEPARTMENT OF THE AIR FORCE**

The Air Force's eight (8) In-House RDT&E Activities are:

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Development Test Center.....	4-10
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**Armstrong Laboratory**



**Armstrong Laboratory**  
San Antonio, TX 78235-5118  
(210) 536-3234

Director: Dr. Brendan B. Godfrey  
Deputy Director: Col Terence J. Lyons

### MISSION

Advance and apply technology to provide the Air Force with superior capabilities in the areas of human resources, crew systems, aerospace medicine, environics, and occupational/environmental health through integration execution of research, development, and operational support. Sponsor and conduct research and development in the fields of biodynamics, biocommunications, environmental compliance, site restoration, toxic hazards, radiation/directed energy bioeffects, aeromedical selection/retention, human engineering, crew protection/life support, logistics and human factors, force acquisition and management, instructional strategies, job skill development and retention, and training devices.

### CURRENT IMPORTANT PROGRAMS

The resources of the Armstrong Laboratory are organized into five integrated "thrusters" which bridge specific research programs and projects. Technical thrust areas are: crew systems; human resources; aerospace medicine; occupational and environmental health; and environics. The Armstrong Laboratory is also host to "Tri-Service Research Centers" in toxicology and directed energy, created in accordance with the Project Reliance initiative for DOD laboratory consolidation. The principle types of technology transferred to commercial industry by Armstrong Laboratory are: environmental compliance and remediation, intelligent training, human safety standards and equipment, health care, logistics and human performance enhancement.

### EQUIPMENT/FACILITIES

The Armstrong Laboratory conducts S&T research at Wright-Patterson AFB OH, Brooks AFB TX, Tyndall AFB FL, and Mesa AZ. Equipment and facilities include: two human centrifuges, a high on-set rate centrifuge located at Brooks AFB and a multi-axis centrifuge located at Wright-Patterson AFB; hypobaric and hyperbaric chambers with capability to simulate high altitude subzero conditions; anechoic chambers for study of human and noise interactions; "virtual worlds" for systems and training research; inhalation toxicology chambers; directed energy laboratory to research bioeffects of lasers and RF radiation; human isolation facility for controlled study of group dynamics in simulated air operations; a secure TEMPEST facility with simulators for EW research and training; a facility for testing subjects (mostly new recruits) in S&T of computer automated training and force management tools; energetics research facility at Tyndall AFB with highly specialized research equipment to study the dynamic effects of contaminants on air and groundwater to include: a model aquifer for tracking groundwater plumes; an environmental spherical chamber for studying atmospheric fate and transport of contaminants; and a perfusion chromatograph system for separation of environmental macro-molecules.

**Armstrong Laboratory**  
 San Antonio, TX 78235-5118  
 (210) 536-3234

Director: Dr. Brendan B. Godfrey  
 Deputy Director: Col Terence J. Lyons

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	3.400	4.900	8.300
6.2 IED (Navy)	NA	NA	NA
6.2 Other	42.200	38.900	81.100
6.3	0.000	51.500	51.500
Subtotal (S&T)	45.600	95.300	140.900
6.4	0.700	0.200	0.900
6.5	0.000	17.400	17.400
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.600	2.500	3.100
TOTAL RDT&E	46.900	115.400	162.300
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	1.700	22.300	24.000
TOTAL FUNDING	48.600	137.700	186.300

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	6.500

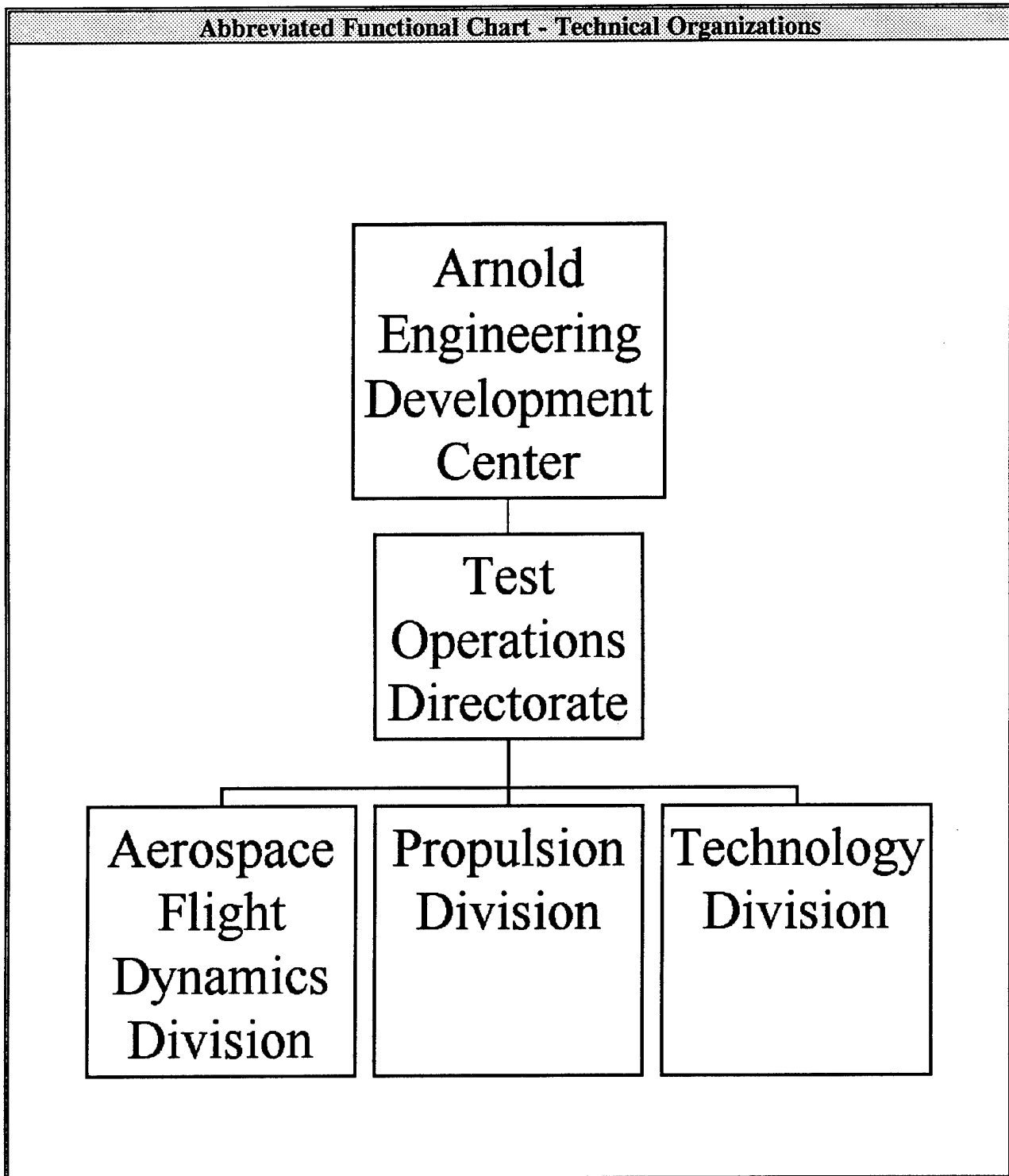
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	493	72	112	309
CIVILIAN	526	134	126	266
TOTAL	1,019	206	238	575

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	1,034.000	REAL PROPERTY	64.860
ADMIN	157.000	* NEW CAPITAL EQUIPMENT	0.308
OTHER	1.000	EQUIPMENT	74.116
TOTAL	1,192.000	* NEW SCIENTIFIC & ENG. EQUIP.	3.016
ACRES	96	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Arnold Engineering Development Center**



**Arnold Engineering Development Center**  
Arnold Air Station, TN 37389-5000  
(615) 454-3000

Commander: Col Lawrence P. Graviss  
Tech Director: John M. Rampy

### **MISSION**

Test aircraft, missile, and space systems and subsystems at the flight conditions they will experience during a mission. AEDC conducts a research and technology program to develop advanced testing techniques and instrumentation, and to support the development of new test facilities. AEDC supports DOD, other Government agencies, private sector companies, and foreign military sales.

### **CURRENT IMPORTANT PROGRAMS**

The most significant programs supported by AEDC in FY 95 are:

1. The F-22 fighter and F-119 engine
2. The F/A-18 fighter
3. Theater Missile Defense
4. The F-15E fighter
5. Seek Eagle
6. The F-414 Turbine Engine
7. Classified Projects

### **EQUIPMENT/FACILITIES**

Included are wind tunnels with sections to 16 ft. and speeds from subsonic to Mach 20; turbine engine test cells which provide simulation to Mach 3; rocket test cells, the largest rated at .5 million lbs. thrust at altitude; dust and snow erosion facilities; a bird impact facility; and two captive trajectory systems. These facilities have supported development and qualification of most major aeronautical, missile, and space systems since 1954. This testing complements expensive and often hazardous flight testing, and assures that system deficiencies are found early, saving time and resources in the overall development, acquisition, and deployment process.



**Arnold Engineering Development Center**  
 Arnold Air Station, TN 37389-5000  
 (615) 454-3000

Commander: Col Lawrence P. Graviss  
 Tech Director: John M. Rampy

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	0.000	0.000	0.000
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	204.988	22.183	227.171
6.7	1.978	0.242	2.220
Non-DOD	12.052	0.294	12.346
<b>TOTAL RDT&amp;E</b>	<b>219.018</b>	<b>22.719</b>	<b>241.737</b>
Procurement	5.310	0.420	5.730
Operations & Maintenance	11.831	0.304	12.135
Other	40.637	0.945	41.582
<b>TOTAL FUNDING</b>	<b>276.796</b>	<b>24.388</b>	<b>301.184</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

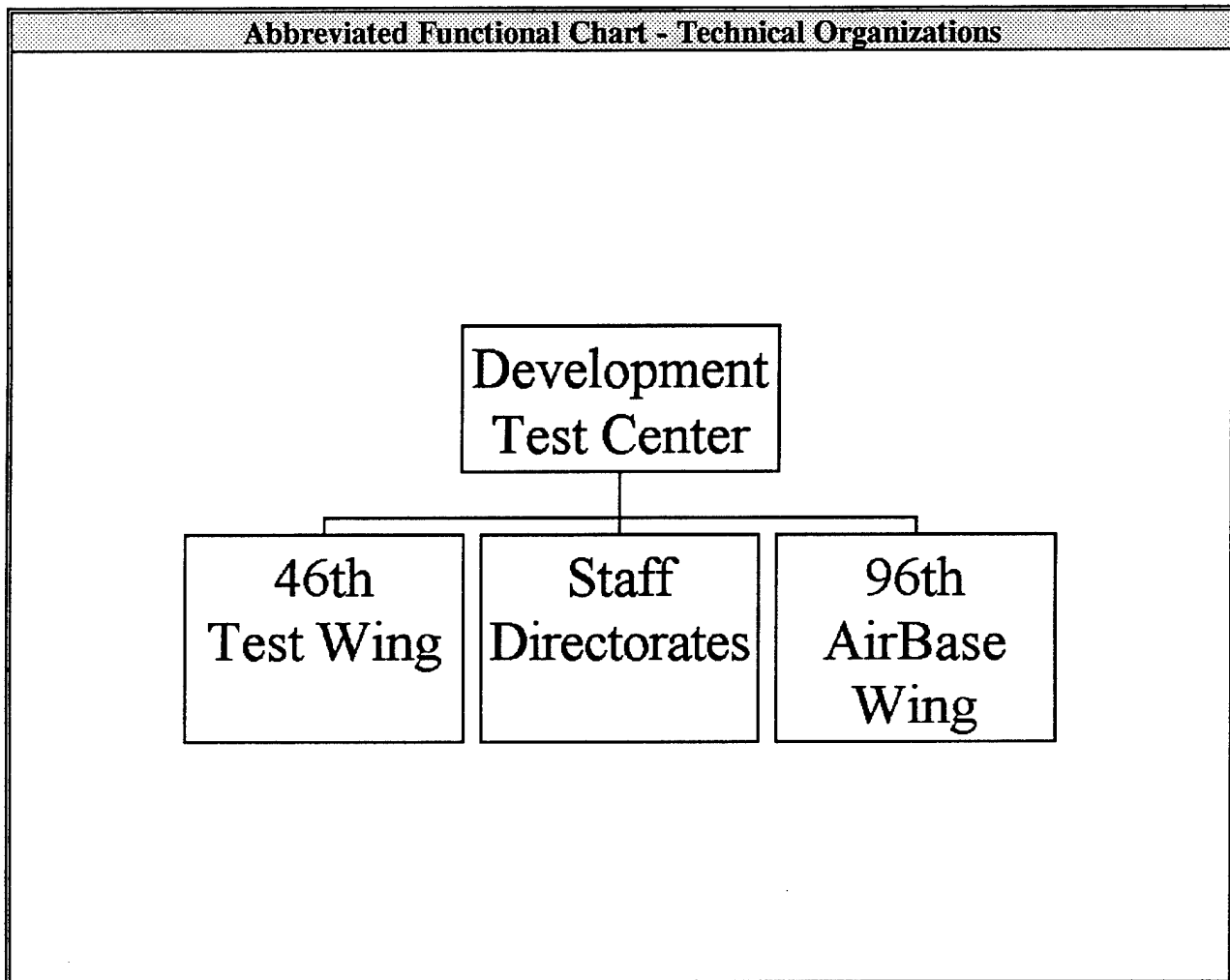
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	123	0	25	98
CIVILIAN	173	4	60	109
<b>TOTAL</b>	<b>296</b>	<b>4</b>	<b>85</b>	<b>207</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	1,049.360	<b>REAL PROPERTY</b>	1,287.054
ADMIN	374.161	* NEW CAPITAL EQUIPMENT	32.974
OTHER	1,261.174	EQUIPMENT	221.004
<b>TOTAL</b>	<b>2,684.695</b>	* NEW SCIENTIFIC & ENG. EQUIP.	9.036
ACRES	39,081	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Development Test Center**



**Development Test Center**  
Eglin AFB, FL 32542-5498  
(904) 882-3931

Commander: MG Stewart E. Cranston  
Exec. Director: Dr. J. Daniel Stewart

### MISSION

Through integrated management of research, development, test, acquisition, and support, we advance and use technology to acquire and sustain superior systems in partnership with our customers and suppliers. We perform continuous product and process improvement throughout the life cycle. As an integral part of the Air Force war fighting team, we contribute to affordable combat superiority, readiness, and sustainability.

### CURRENT IMPORTANT PROGRAMS

The following are some of the more important programs on which AFDTC is working:

AMRAAM\*  
Hellfire  
Chicken Little\*\*  
Joint Stars  
Seek Eagle  
F-15E TEWS  
Sensor Fuze Weapons  
JTIDS  
JDAM\*  
JSOW\*  
AIM - 9X  
ASRAAM  
Various Allied Weapons

\* Navy & Air Force Joint Programs

\*\* Army & Air Force Joint Program

### EQUIPMENT/FACILITIES

Equipment and facilities include: climatic testing facility; simulation facilities; gun test facility; security systems test facility; damage potential sled track; time-space-position instrumentation facilities; telemetry systems facilities; data handling facilities; marine operations facilities; photographic laboratory; weather characterization facilities; land test ranges; gulf water test areas; laser ranging/ tracking facilities; frequency control and analysis facilities; electro-optical systems facilities (ground and airborne); and aircraft maintenance (test associated) facilities.

Development Test Center  
 Eglin AFB, FL 32542-5498  
 (904) 882-3931

Commander: MG Stewart E. Cranston  
 Exec. Director: Dr. J. Daniel Stewart

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	0.000	0.000	0.000
6.4	0.300	2.400	2.700
6.5	3.400	0.000	3.400
6.6	252.400	264.600	517.000
6.7	0.100	1.400	1.500
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	256.200	268.400	524.600
Procurement	0.000	0.000	0.000
Operations & Maintenance	3.200	13.500	16.700
Other	3.700	4.800	8.500
TOTAL FUNDING	263.100	286.700	549.800

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

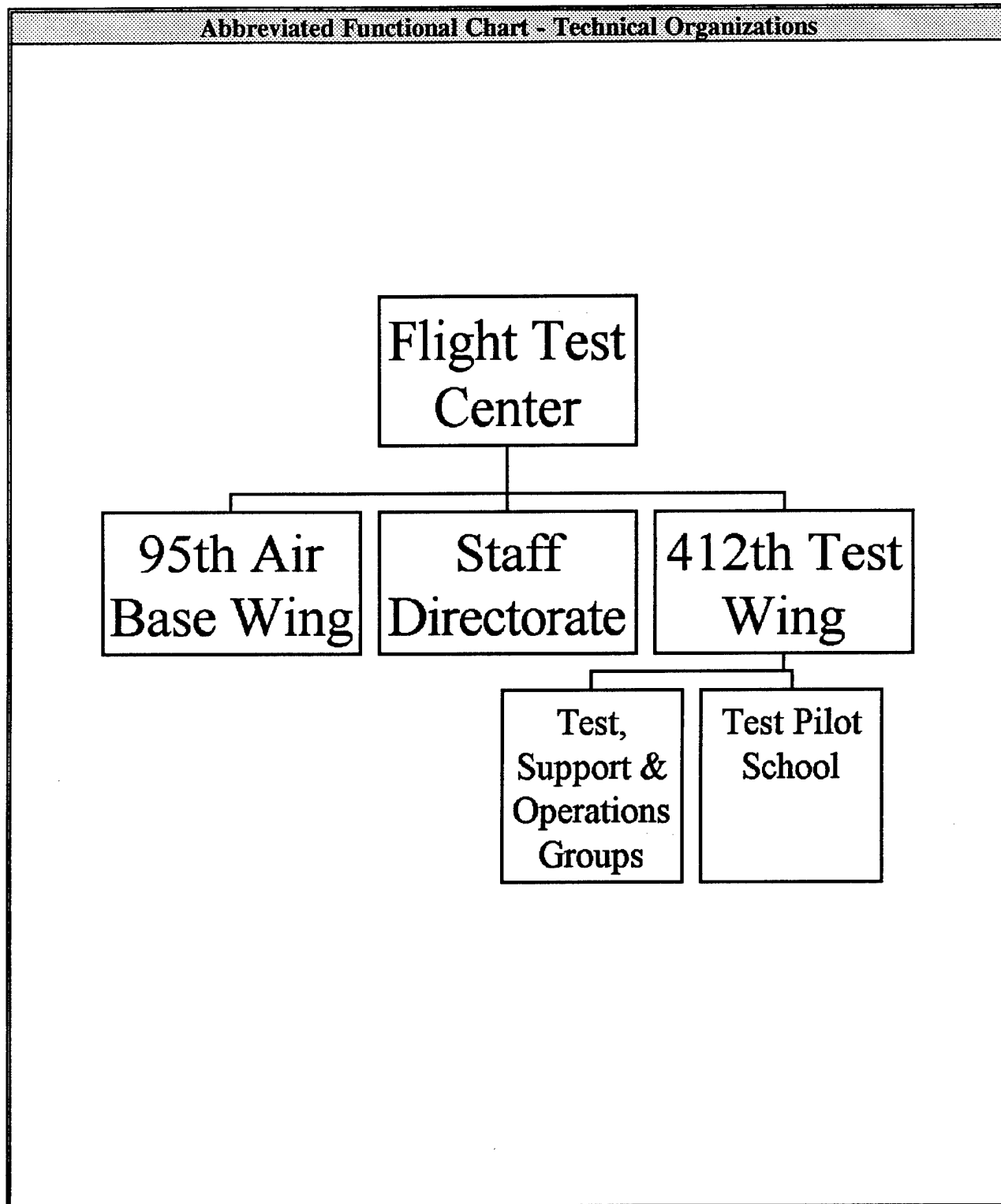
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	4,212	0	75	4,137
CIVILIAN	2,792	3	347	2,442
TOTAL	7,004	3	422	6,579

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	1,801.631	REAL PROPERTY	687.176
ADMIN	829.156	* NEW CAPITAL EQUIPMENT	0.000
OTHER	12,613.444	EQUIPMENT	409.690
TOTAL	15,244.231	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	463,115	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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Flight Test Center



**Flight Test Center**

Edwards AFB, CA 93524-1000  
(805) 277-3837

Commander: BG Richard L. Engel  
Exec. Director: Richard L. Hildebrand

**MISSION**

The Air Force Flight Test Center (AFFTC) is charged with supporting the Air Force Materiel Command (AFMC) mission by conducting and supporting testing of both manned and unmanned aerospace vehicles. This mission involves not only all aspects of testing of air vehicles, but includes the flight evaluation and recovery of research vehicles, development testing of aerodynamic decelerators, and the operation of the Air Force Test Pilot School. To support this testing the AFFTC operates and manages the Edwards Flight Test Range and the Utah Test and Training Range. The Center operates a fleet of test bed aircraft for early development and check out of new avionics and Advance Range Instrumentation Aircraft (ARIA) worldwide in support of a variety of space and missile tests. The center supports and participates in test and evaluation programs for the Air Force, other Department of Defense Services, other government agencies, as well as for contractors and foreign governments.

**CURRENT IMPORTANT PROGRAMS**

The following are some of the current important programs on which the AFFTC is working: B-2 development; AC-130U gunship qualification and test and evaluation program; C-17 transport development; B-1B follow-on development; F-117 development; F-15 follow-on development; F-16 follow-on development; LANTRIN follow-on development; BIG CROW; TSSAM mission support; Advance Range Instrumentation Aircraft; B-1B Conventional weapons upgrade; U-2 follow-on development; M-130 development; and F-22 development.

**EQUIPMENT/FACILITIES**

Major unique facilities and equipment include: Integrated Facility for Avionics System Test (IFAST); Benefield Anechoic Facility; real time mission control facility; precision impact range area used for bombing/gunnery/infrared systems integration; personnel and cargo parachute drop zones; hydrant refueling system for heavy aircraft; aircraft weight and balance facility complex; R-2508 restricted airspace; photo/video lab for airborne and ground testing; intermediate aircraft maintenance support capability; Pacer Comet jet engine test facility; horizontal aircraft thrust stand; photo resolution range; instrumented low level terrain following course; and aircraft gun system harmonization range (GUNBUTT).



## Flight Test Center

Edwards AFB, CA 93524-1000

(805) 277-3837

Commander: BG Richard L. Engel

Exec. Director: Richard L. Hildebrand

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	0.000	0.000	0.000
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	268.596	314.122	582.718
6.7	0.010	1.325	1.335
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	268.606	315.447	584.053
Procurement	0.000	0.270	0.270
Operations & Maintenance	7.419	23.275	30.694
Other	6.618	25.070	31.688
TOTAL FUNDING	282.643	364.062	646.705

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	11.353

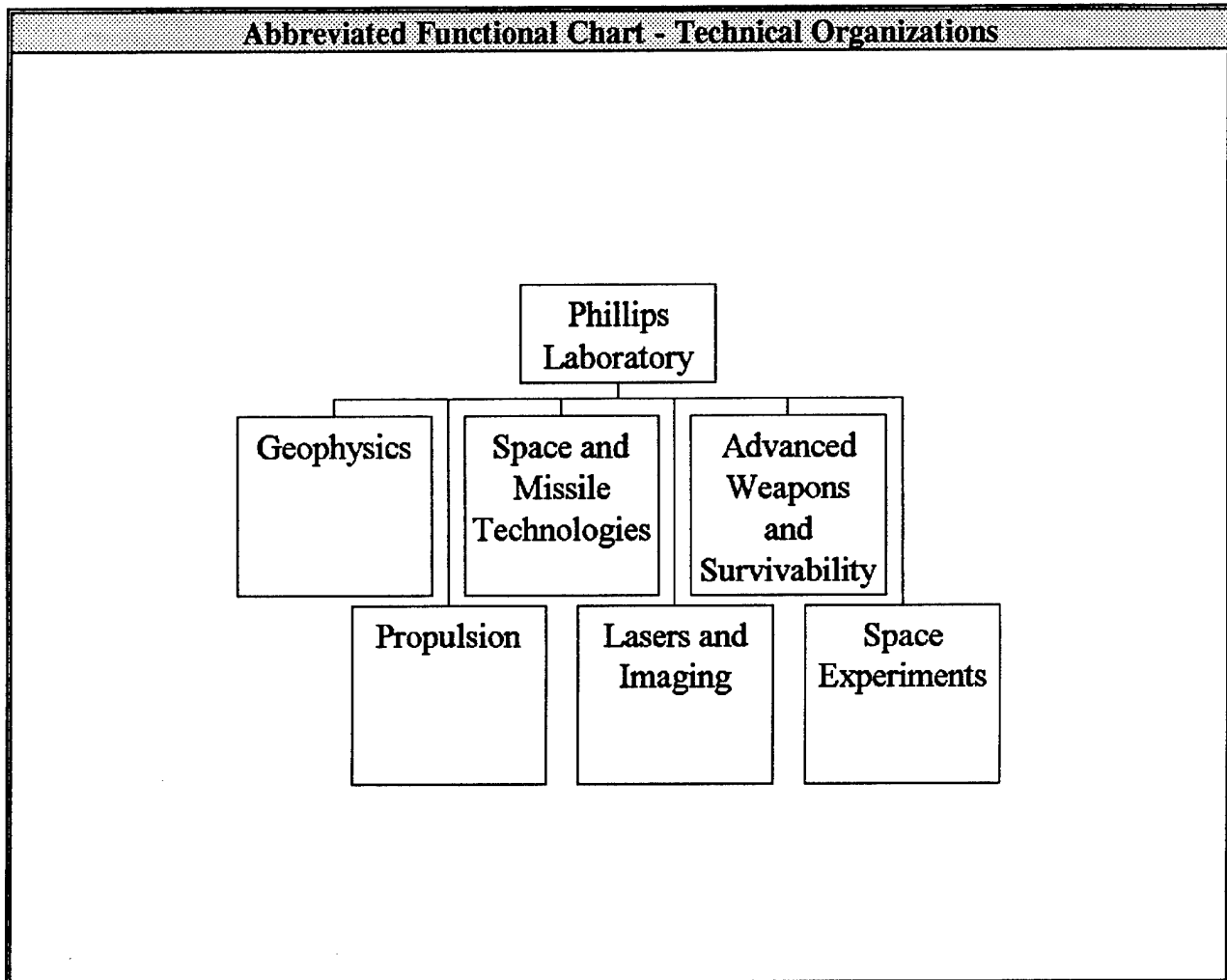
PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	4,432	47	391	3,994
CIVILIAN	3,340	16	670	2,654
TOTAL	7,772	63	1,061	6,648

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	307.691	REAL PROPERTY	756.589
ADMIN	274.788	* NEW CAPITAL EQUIPMENT	0.000
OTHER	9,023.401	EQUIPMENT	416.000
TOTAL	9,605.880	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	297,685	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

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**Phillips Laboratory**



**Phillips Laboratory**  
Kirtland AFB, NM 87117-5776  
(505) 846-5546

Commander: Colonel Michael L. Heil  
Executive Dirct: Dr. R. Earl Good

### **MISSION**

The mission of Phillips Laboratory (PL) is to advance science and technology to provide the developments and improvements needed to continue the accomplishment of the Air Force mission. PL is primarily charged with planning, organizing, directing, executing, and controlling USAF research and development in the following areas: a) Space and Missiles Technology; b) Space Experiments; c) Directed Energy Weapons, and Weapons Effects; d) Survivability; and e) Geophysics Technical Developments and Effects on Systems.

### **CURRENT IMPORTANT PROGRAMS**

The following are some of the current important programs (thrusts) on which the laboratory is working:

- (a) Space and missiles technology focuses on spacecraft structures, power and thermal management, sensors, and electronics.
- (b) Space experiments are conducted in a ground, balloon-borne, aircraft or space mode. Also included are related ground acceptance and space/launch environmental testing.
- (c) Propulsion technology focuses on advanced concepts involving motors, propellants and test techniques. Most of this work is performed by Phillips Laboratory employees at Edwards Air Force Base.
- (d) Airborne laser technology will be able to acquire, track, and kill theater ballistic missile during their boost phase.
- (e) Lasers and imaging technology involves demonstrating the technical and engineering feasibility of lasers and imaging systems.
- (f) Advanced weapons and survivability develops high-energy plasma and microwave technologies, electromagnetic pulse hardening, space systems survivability, and advanced techniques and computer simulations for weapon effects.
- (g) Geophysics conducts research to further Air Force understanding of the environment between the Earth and Sun and its effects on systems and operations. This work is conducted by Laboratory people at Hanscom Air Force Base.

**EQUIPMENT/FACILITIES**

Primary operating locations are: Kirtland AFB NM, Edwards AFB CA, and Hanscom AFB MA. Unique facilities include: at Kirtland AFB: the Space Structures/Composites Laboratory, Aerospace Engineering Facility, High Energy Research and Technology Facility, High Energy Microwave Laboratory, High Energy Plasma Laboratory, Starfire optical Range, and underground tunnels in the Manzano Weapons Storage Area; at Edwards AFB: rocket test stands, Hydrodynamic Test laboratory, Chemical Experiments Laboratory, National Hover Test Facility; at Hanscom AFB: Haskell Observatory, Satellite Communications Facility, LIDAR Pentahouse Facility, Ionospheric Modification Laboratory, Air Force Interactive Meteorological System Laboratory, Weather Characterization & Advanced Weather System Laboratory, Cryogenic Simulation Facility, and IR Detection Facility.

Phillips Laboratory  
Kirtland AFB, NM 87117-5776  
(505) 846-5546

Commander: Colonel Michael L. Heil  
Executive Dirct: Dr. R. Earl Good

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	8.800	10.300	19.100
6.2 IED (Navy)	NA	NA	NA
6.2 Other	20.600	133.000	153.600
6.3	13.000	164.000	177.000
Subtotal (S&T)	42.400	307.300	349.700
6.4	0.000	0.000	0.000
6.5	0.000	32.200	32.200
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.600	16.800	17.400
TOTAL RDT&E	43.000	356.300	399.300
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	1.000	8.800	9.800
TOTAL FUNDING	44.000	365.100	409.100

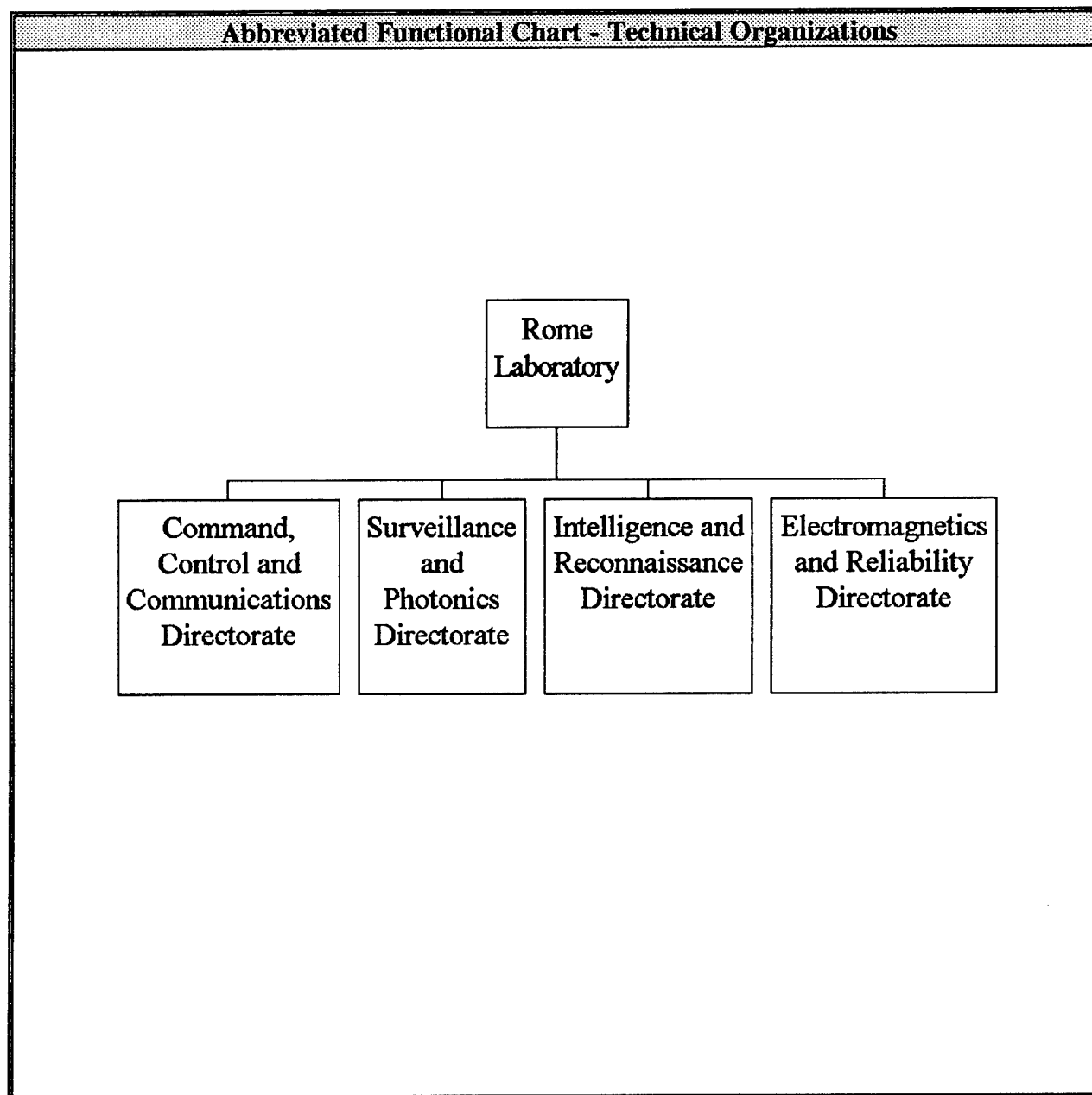
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	566	40	292	234
CIVILIAN	1,228	219	366	643
TOTAL	1,794	259	658	877

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	995.828	REAL PROPERTY	1,043.200
ADMIN	652.384	* NEW CAPITAL EQUIPMENT	10.000
OTHER	864.459	EQUIPMENT	1,097.500
TOTAL	2,512.671	* NEW SCIENTIFIC & ENG. EQUIP.	866.800
ACRES	16,620	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

**Rome Laboratory**



**Rome Laboratory**  
Rome, NY 13441-4514  
(315) 330-7701

Commander: Colonel Ted F. Bowlds  
Deputy Director: Mr. Raymond P. Urtz

### **MISSION**

Advance the state-of-the-art of science and technology in Command, Control, Communications, Computing and Intelligence (C4I) research and development and transition these technologies to meet customer needs. To achieve this the laboratory:

- a. Conducts vigorous research, development, and test programs in all applicable technologies;
- b. Transitions technology to current and future systems to improve operational capability, readiness, and supportability;
- c. Provides a full range of technical support to Air Force Materiel Command product centers and other Air Force organizations;
- d. Conducts selected acquisition programs for low-volume, limited quantity intelligence and software systems; and
- e. Promotes transfer of technology to the private sector.

Rome Lab supports this mission by developing techniques and equipment for the surveillance of ground and aerospace objects, and for inter-theater and intra-theater survivable communications. Rome Lab develops technologies for battle management information systems and the handling of intelligence data. The laboratory is also pursuing the following technologies: artificial intelligence/expert systems, solid state sciences and materials, electromagnetics, photonics, signal processing, computer architectures, and reliability, maintainability and compatibility of electronic systems.



**CURRENT IMPORTANT PROGRAMS**

The following are some of the important programs/thrusts on which the laboratory is working: Low observable surveillance, e.g., advanced signal processing and passive sensors; Secure survivable communications, e.g., joint multi-band multi-mode radio; Battle information management and decision aids; Non-cooperative target identification; Signal processing; Artificial intelligence, e.g., knowledge-based software assistant; Distributed computing technologies; Multi-level secure information systems, e.g., survivable asynchronous transfer mode (ATM); Photonics, e.g., optical signal processing, storage, and transmission; Intelligence processing; and Reliability of electronic components and systems.

Technology Transfer programs include: education Partnership with Syracuse University to assess intellectual property issues and perform assessments of technologies; jointly formed NYSTEC with New York State to assist the lab in transferring defense technologies to non-defense markets in the private and public sectors; participation in numerous technology conferences and conventions; establishment of a Patents Data Base as part of the RL World Wide Web Home Page; establishment of a Technology Transfer section within the RL Home Page on the World Wide Web; participation in joint training exercises Joint Warrior Interoperability Demonstration (JWID) '95 at Hanscom AFB, MA and Global Yankee '95 at Ft Drum, NY.

**EQUIPMENT/FACILITIES**

Primary operating locations are: Rome Laboratory, NY and Hanscom AFB, MA. Equipment and facilities include: Reconnaissance Exploitation facility; Photonics facility; Electronic Intelligence (ELINT) Development facility; Electronic Counter-Countermeasures (ECCM) and Signal Processing facility; Solid State Device Failure Analysis facility; Command and Control Technology Center; Communications Experimental facility; Radio Transmission facility; Electro-Magnetic Vulnerability facility; Surveillance facility; Audio/Speech Processing facility; SPEAKEASY Test facility; Materials Synthesis and Development facility; Intelligence Information Processing facility; Multisensor Fusion Testbed; Experimental Device Fabrication facility; Imagery Data Base facility; Network Design facility; Distributed Systems Evaluation Environment Testbed; Software Engineering and Artificial Intelligence facility; and a variety of antenna facilities.

Rome Laboratory  
Rome, NY 13441-4514  
(315) 330-7701

Commander: Colonel Ted F. Bowlds  
Deputy Director: Mr. Raymond P. Urtz

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	2.959	13.704	16.663
6.2 IED (Navy)	NA	NA	NA
6.2 Other	47.357	87.876	135.233
6.3	4.425	90.809	95.234
<b>Subtotal (S&amp;T)</b>	<b>54.741</b>	<b>192.389</b>	<b>247.130</b>
6.4	2.866	33.512	36.378
6.5	0.459	19.010	19.469
6.6	0.066	1.719	1.785
6.7	0.178	16.366	16.544
Non-DOD	0.036	3.110	3.146
<b>TOTAL RDT&amp;E</b>	<b>58.346</b>	<b>266.106</b>	<b>324.452</b>
Procurement	0.578	5.918	6.496
Operations & Maintenance	3.615	78.227	81.842
Other	9.526	0.130	9.656
<b>TOTAL FUNDING</b>	<b>72.065</b>	<b>350.381</b>	<b>422.446</b>

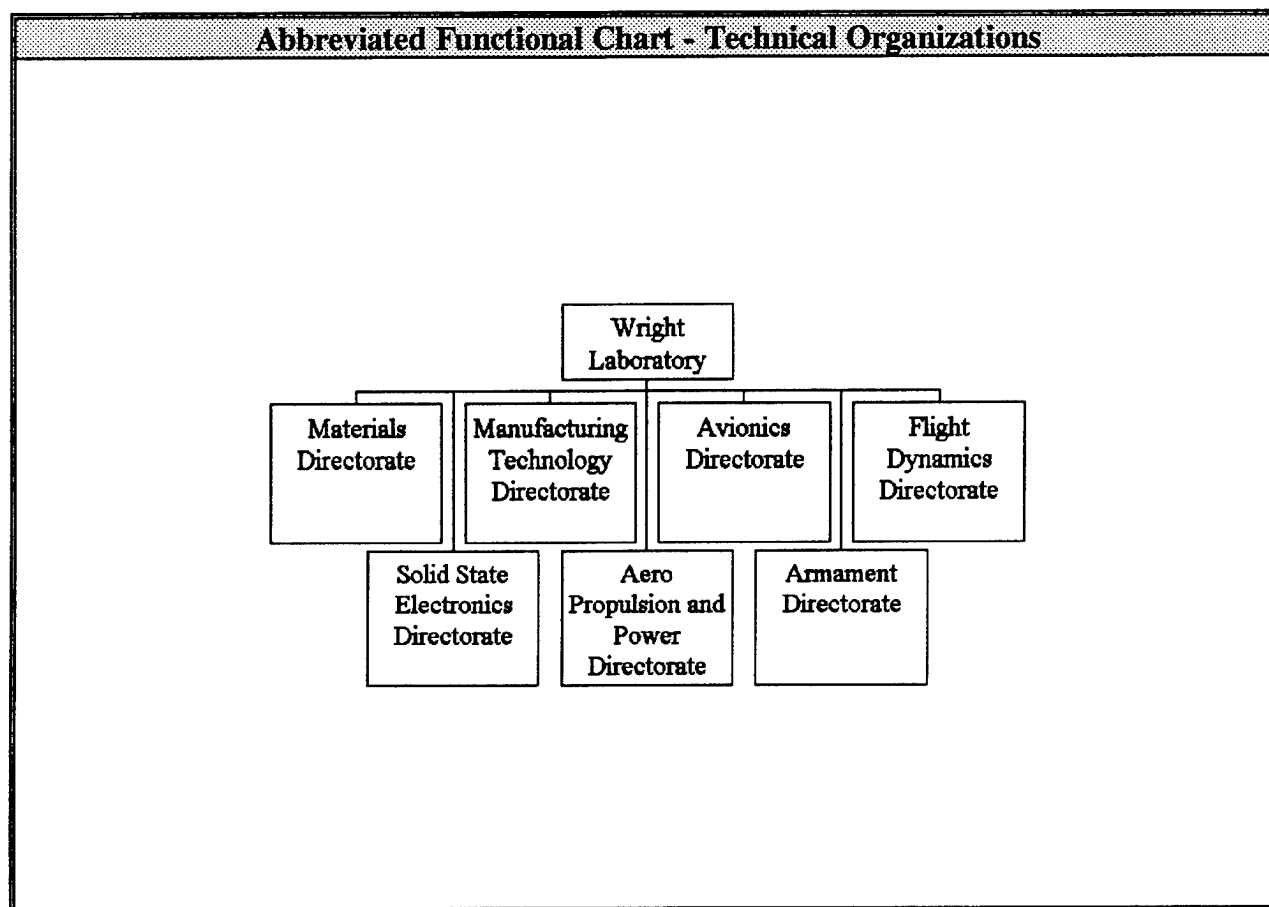
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	131	4	59	68
CIVILIAN	808	77	428	303
<b>TOTAL</b>	<b>939</b>	<b>81</b>	<b>487</b>	<b>371</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	825.000	REAL PROPERTY	65.000
ADMIN	236.000	* NEW CAPITAL EQUIPMENT	0.000
OTHER	438.000	EQUIPMENT	129.603
<b>TOTAL</b>	<b>1,499.000</b>	* NEW SCIENTIFIC & ENG. EQUIP.	23.599
ACRES	1,616	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## Wright Laboratory



**Wright Laboratory**  
WPAFB, OH 45433-7542  
(513) 255-5508

Commander: Colonel Richard W. Davis  
Deputy Director: Mr. O. Lester Smithers Jr.

#### **MISSION**

Lead and focus aerospace technology to meet our customer needs.

#### **CURRENT IMPORTANT PROGRAMS**

The following are some of the current important programs/thrusts on which the laboratory is working:

- Aeropropulsion and Power Technology;
- Air Vehicles Technology;
- Avionics and Solid State Devices Technology;
- Conventional Armament Technology;
- Materials Technology; and
- Manufacturing Technology.

Active CRDAs include: development of a user-friendly computer program to track hazardous materials; a cost effective rehabilitation of ailing infrastructure (bridges) using composite materials; an understanding of fire suppression systems for high speed vehicles including aircraft; a new concept for a socket wrench; and durable coatings on aluminum ice cube trays which have applications to aircraft parts.

**EQUIPMENT/FACILITIES**

Primary operating locations are: Wright-Patterson AFB, OH and Eglin AFB, FL. Equipment and facilities include a:

- (a) Turbine Research Laboratory to simulate all relevant engine conditions governing turbine operation.
- (b) Compressor Research Facility capable of testing full-scale, multi-stage, and single shaft fans and compressors at speed/powers of 3,000 to 16,000 rpm at 3,000 hp and 16,000 to 30,000 rpm at 15,000 hp.
- (c) Kinetic Kill Vehicle Digital and Hardware-In-The-Loop Simulation Facility to realistically simulate launch-to-impact scenario for guided interceptors.
- (d) Integrated Avionics Lab for real-time dynamic testing of integrated avionics systems in realistic operational scenarios.
- (e) In-Flight Simulator to examine the flight characteristics and properties of different aircraft, different flight control systems and cockpit layouts.
- (f) Variable Stability In-Flight Simulator Test Aircraft for flight control, pilot/vehicle interface and avionics/flight control integration research programs.
- (g) Subsonic Aerodynamic Research Laboratory with Mach range from 0.2 to 5.0, for high angle of attack testing, very low turbulence, very large force measuring, and testing power-simulated vehicles.
- (h) DOD Landing Gear Development Facility for aircraft tire/wheel testing, 350 mph top speed, 150,000 to 1 lb. max load = 20 deg yaw and camber, and aircraft brakes/wheels/tire testing, 200 mph top speed, 350,000 to 1 lb. max load, 220 M ft. lbs. max energy.
- (i) Laser Hardened Materials Evaluation Lab II provides well characterized 100+ kw continuous wave, carbon dioxide laser for materials response phenomenology, geometric scaling, and sub-scale component testing.
- (j) Device Research Laboratory for extensive experimental growth and characterization of electronic and optical properties of III-V materials and devices.
- (k) Structures Test Facility with capability for static and fatigue testing of complete aerospace vehicles.
- (l) Compact Radar Cross Section Range with down-range imaging capability and capability to measure small targets with accuracy.
- (m) Optical Research Facility which can measure far-field patterns of large (up to 2.4 meters in diameter) antenna systems under controlled temperature and pressure conditions (simulate altitudes up to 270,000 feet).
- (n) Aeroballistics Research Facility which is designed to study free-flight characteristics of projectiles and missile configurations under controlled atmospheric conditions (22 +/- deg. centigrade, less than 50% relative humidity). Test range is instrumented for 207 m., 2.66 m. square cross section for first 69 m.

Wright Laboratory  
WPAFB, OH 45433-7542  
(513) 255-5508

Commander: Colonel Richard W. Davis  
Deputy Director: Mr. O. Lester Smithers Jr.

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	1.600	NA	1.600
6.1 Other	14.700	18.200	32.900
6.2 IED (Navy)	NA	NA	NA
6.2 Other	114.800	264.900	379.700
6.3	19.700	365.900	385.600
Subtotal (S&T)	150.800	649.000	799.800
6.4	2.000	14.400	16.400
6.5	0.000	77.600	77.600
6.6	0.000	116.800	116.800
6.7	0.000	0.000	0.000
Non-DOD	0.900	5.000	5.900
<b>TOTAL RDT&amp;E</b>	<b>153.700</b>	<b>862.800</b>	<b>1,016.500</b>
Procurement	0.000	21.700	21.700
Operations & Maintenance	0.000	3.600	3.600
Other	18.900	8.200	27.100
<b>TOTAL FUNDING</b>	<b>172.600</b>	<b>896.300</b>	<b>1,068.900</b>

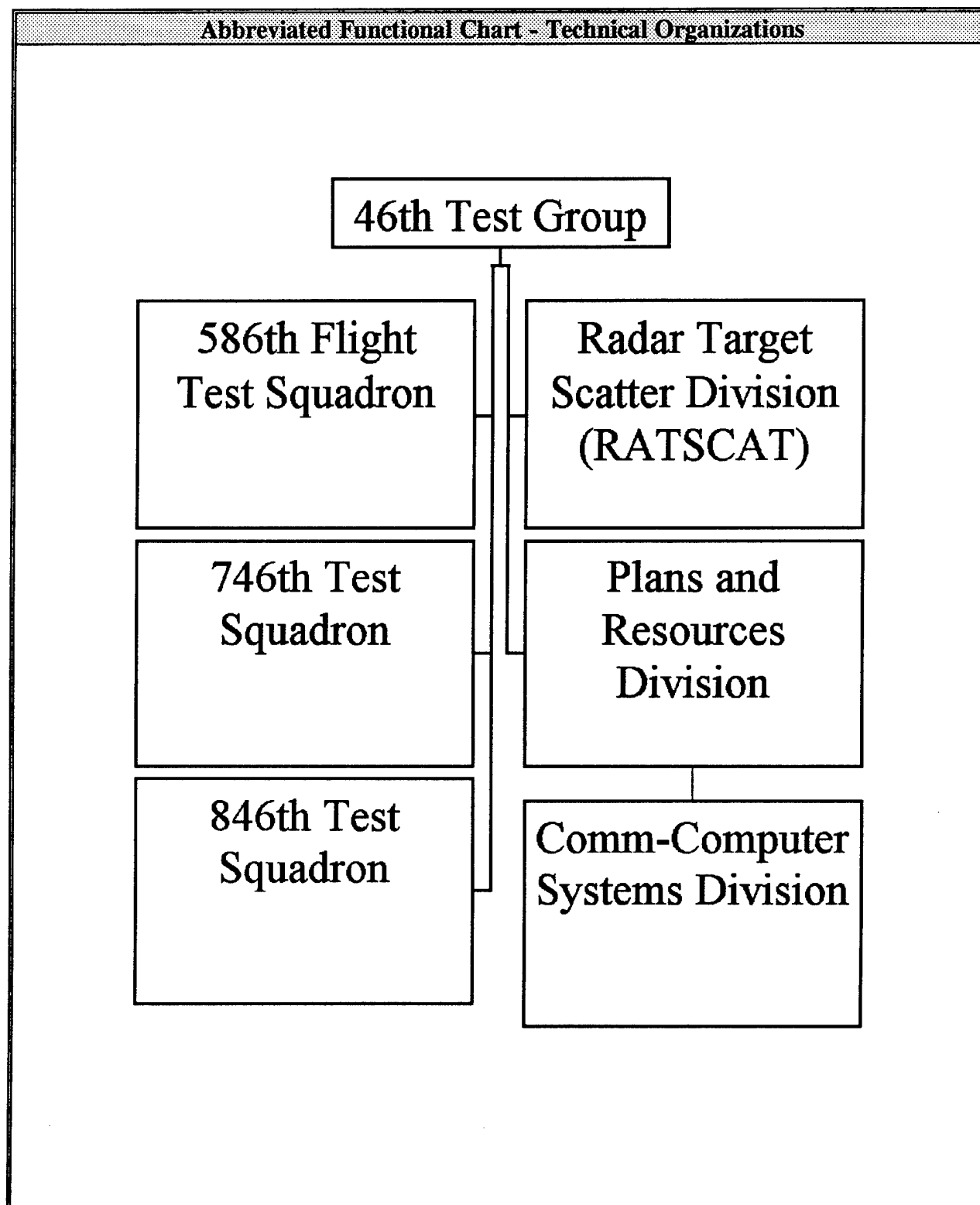
MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	390	37	255	98
CIVILIAN	2,073	219	1,168	686
<b>TOTAL</b>	<b>2,463</b>	<b>256</b>	<b>1,423</b>	<b>784</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	1,447.300	REAL PROPERTY	965.000
ADMIN	671.400	* NEW CAPITAL EQUIPMENT	2.200
OTHER	776.386	EQUIPMENT	2,082.290
<b>TOTAL</b>	<b>2,895.086</b>	* NEW SCIENTIFIC & ENG. EQUIP.	12.900
ACRES	932	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

46th Test Group



**46th Test Group**

Holloman AFB, NM 88330-7715  
(505) 475-1368

Commander: Colonel Thomas U. Mead  
Technical Dir.: Mr. Kenneth R. Holland

**MISSION**

Operate the world's premier facilities for measuring radar signatures, testing missile guidance systems, testing aircraft navigation systems, and testing armaments and escape systems on the high speed test track. Conduct flight testing of the nation's highest-priority air-to-air missile systems. Provide airspace control for the White Sands Missile Range (WSMR).

**CURRENT IMPORTANT PROGRAMS**

The 46 TG is supporting programs such as hypersonic lethality testing for Theater Missile Defense (TMD), Crew Escape System Technology (CREST) tests, Global Positioning System (GPS) integration for all mandated DOD weapon systems, field tests of the Federal Aviation Administration's (FAA) GPS navigational and landing aids, and electromagnetic testing including radar cross section and antenna pattern measurements of such advanced systems as the B-2, the Advanced Cruise Missile, and the Advanced Tactical Fighter.

**EQUIPMENT/FACILITIES**

Equipment and facilities include: (a) High Speed Test Track (HSTT): the world's longest sled track (50,788 ft), the Project Reliance lead for all DOD test tracks, and the Center of Excellence for ejection seat testing. The HSTT supports sled speeds exceeding Mach 8 and accelerations up to 200G for aerodynamic tests, impact tests, and missile simulations in various controlled environments of rain, particle, and blast/shock wave; (b) Central Inertial Guidance Test Facility (CIGTF): America's most seismically stable (0.01 micro G isolated background level) test bed for truth reference validation of navigation systems. CIGTF has the largest collection of precision rate tables (10), multi-axis tables (12), and precision centrifuges (3) in DOD; (c) Radar Target Scatter (RATSCAT) Mainsite and RATSCAT Advanced Measurement System (RAMS): America's only site capable of low observable, monostatic/bistatic RCS measurement for full-scale and sub-scale systems--up to 100,00 lbs at Mainsite and 30,000 lbs at RAMS. Both facilities have computer resources to support RCS target predictions, detection profiles, model validation, and real time diagnostic imaging; and (d) 586th Flight Test Squadron: Aircraft support for testing of air-to-air missiles, air-to-ground ordnance, photo/safety chase, inertial navigational systems, and Global Positioning Systems. The squadron owns two T-38's, rents an F-15 and F-16 from Eglin AFB, and rents a C-12 from the Army when needed.



## 46th Test Group

Holloman AFB, NM 88330-7715  
(505) 475-1368

Commander: Colonel Thomas U. Mead  
Technical Dir.: Mr. Kenneth R. Holland

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
RDT&E:			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	0.000	0.000	0.000
6.3	0.000	0.000	0.000
Subtotal (S&T)	0.000	0.000	0.000
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	22.518	34.128	56.646
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
TOTAL RDT&E	22.518	34.128	56.646
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	6.033	2.020	8.053
TOTAL FUNDING	28.551	36.148	64.699

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	186	1	25	160
CIVILIAN	289	2	164	123
TOTAL	475	3	189	283

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	572.971	REAL PROPERTY	238.792
ADMIN	55.009	* NEW CAPITAL EQUIPMENT	0.000
OTHER	132.641	EQUIPMENT	157.441
TOTAL	760.621	* NEW SCIENTIFIC & ENG. EQUIP.	0.000
ACRES	7,052	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

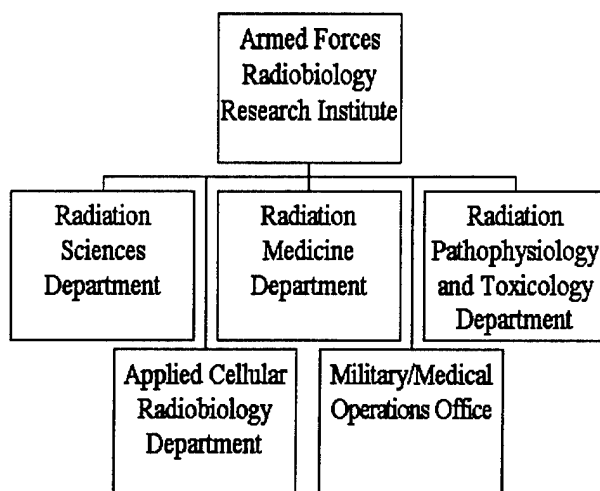
**UNIFORMED SERVICES  
UNIVERSITY OF  
HEALTH SCIENCES**

**UNIFORMED SERVICES UNIVERSITY of the HEALTH SCIENCES  
(USUHS)**

The only In-House RDT&E Activity within USUHS is the Armed Forces Radiobiology Research Institute (AFRRI).

**Armed Forces Radiobiology Research Institute**

**Abbreviated Functional Chart - Technical Organizations**



**Armed Forces Radiobiology Research Institute**  
Bethesda, MD 20889-5603  
(301) 295-1210

Dir.: Captain Eric E. Kearsley, USN  
Scientific Dir.: Dr. E. John Ainsworth

### **MISSION**

The mission of Armed Forces Radiobiology Research Institute shall be to conduct research in the field of radiobiology and related matters essential to the operational and medical support of the Department of Defense and military services. The biomedical research program is directed toward acquiring the quantitative and qualitative data necessary for assessing the effects of radiation on man.

### **CURRENT IMPORTANT PROGRAMS**

Evaluation of early and late effects of radiation exposures at low dose rates.

Impact of imbedded depleted uranium shrapnel on biological systems.

Counter-proliferation of weapons of mass destruction (WMD).

Determining reliable bio-dosimetry markers.

Continue to support studies of residents of the former Soviet Union who were exposed to chronic radiation through environmental contamination.

Optimize combinations of protective agents to promote survival and combat effectiveness following irradiation at high or low dose rates.

Develop medical countermeasures to treat radiation injuries.

### **EQUIPMENT/FACILITIES**

Functions: Operate facilities for conducting radiobiology research and disseminating results; conduct advanced training; provide analysis consultation on bioeffects of radiation; and perform such other research functions as required. Major equipment includes: pulse and steady state nuclear reactor, 100,000-Curie Cobalt-60 irradiator, electron linear accelerator, X-ray, theratron exposure capability and electron microscope. Support services include: measurement of radiation fields, provision and care of laboratory animals, equipment design and fabrication assistance, real-time data acquisition system, television and film documentation of experiments, personnel and environmental monitoring, editorial assistance in report preparation, and a large technical library.

Armed Forces Radiobiology Research Institute  
Bethesda, MD 20889-5603  
(301) 295-1210

Dir.: Captain Eric E. Kearsley, USN  
Scientific Dir.: Dr. E. John Ainsworth

FY95 FUNDING DATA (MILLIONS \$)			
APPROPRIATION	IN-HOUSE	OUT-OF-HOUSE	TOTAL
<b>RDT&amp;E:</b>			
6.1 ILIR	0.000	NA	0.000
6.1 Other	0.000	0.000	0.000
6.2 IED (Navy)	NA	NA	NA
6.2 Other	7.339	0.000	7.339
6.3	3.884	0.000	3.884
Subtotal (S&T)	11.223	0.000	11.223
6.4	0.000	0.000	0.000
6.5	0.000	0.000	0.000
6.6	0.000	0.000	0.000
6.7	0.000	0.000	0.000
Non-DOD	0.000	0.000	0.000
<b>TOTAL RDT&amp;E</b>	<b>11.223</b>	<b>0.000</b>	<b>11.223</b>
Procurement	0.000	0.000	0.000
Operations & Maintenance	0.000	0.000	0.000
Other	1.224	0.000	1.224
<b>TOTAL FUNDING</b>	<b>12.447</b>	<b>0.000</b>	<b>12.447</b>

MILITARY CONSTRUCTION (MILLIONS \$)	
Military Construction (MILCON)	0.000

PERSONNEL DATA (END OF FISCAL YEAR 1995)				
TYPE	END STRENGTH	SCIENTISTS & ENGINEERS		TECHNICAL SUPPORT & OTHER PERSONNEL
		PHD'S	OTHER	
MILITARY	62	15	8	39
CIVILIAN	103	25	9	69
<b>TOTAL</b>	<b>165</b>	<b>40</b>	<b>17</b>	<b>108</b>

SPACE AND PROPERTY			
SPACE (THOUSANDS OF SQ FT)		PROPERTY ACQUISITION COST (MILLIONS \$)	
LAB	61.750	<b>REAL PROPERTY</b>	14.347
ADMIN	34.257	* NEW CAPITAL EQUIPMENT	0.045
OTHER	23.908	<b>EQUIPMENT</b>	13.380
<b>TOTAL</b>	<b>119.915</b>	* NEW SCIENTIFIC & ENG. EQUIP.	0.075
<b>ACRES</b>	<b>10</b>	* Subset of previous category. See Equip./Facilities Narrative.	

NA = Not Applicable

## APPENDICES

**APPENDIX A**  
**DISESTABLISHMENT, ESTABLISHMENT,**  
**OR CHANGE IN ORGANIZATION NAME**



**APPENDIX A**

**DISESTABLISHMENT, ESTABLISHMENT,  
OR CHANGES IN ORGANIZATION NAME  
BETWEEN FY94 AND FY95**

**DEPARTMENT OF THE ARMY**

The **Army Space and Strategic Defense Command** has been found to not meet the criteria as an In-House RDT&E organization and therefore has been deleted from this report.

The **Army Simulation, Training and Instrumentation Command** has been found to not meet the criteria as an In-House RDT&E organization and therefore has been deleted from this report.

The **Army Biomedical Research & Development Laboratory** was re-established.

The **Cold Regions Test Center** has been consolidated under **Yuma Proving Ground**.

The **Electronic Proving Ground** has been consolidated under **White Sands Missile Range**.

**DEPARTMENT OF THE NAVY**

No changes.

**DEPARTMENT OF THE AIR FORCE**

No changes.

**DEPARTMENT OF DEFENSE AGENCIES**

The higher headquarters for the **Armed Forces Radiobiology Research Institute (AFRRI)** was incorrectly identified in the FY94 Report as the Defense Nuclear Agency. Starting in FY94 AFRRI was reassigned to the Uniformed Services University of the Health Sciences (USUHS).

Note: Activities in **bold typeface** were reported in the FY 94 edition of this report as separate Activities.

**APPENDIX A**

**DISESTABLISHMENT, ESTABLISHMENT,  
OR CHANGES IN ORGANIZATION NAME  
BETWEEN FY94 AND FY95**

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## **APPENDIX B**

# **DEFINITIONS OF REPORT ELEMENTS**

## APPENDIX B DEFINITIONS OF REPORT ELEMENTS

### INTRODUCTORY PRECAUTIONARY NOTE

Data in this report should not be summarized or used for comparative analyses between Activities and/or across Services because labs/centers use different business systems to satisfy their special needs. Some organizations (e.g., Navy) operate on an industrial funding basis; that is, they charge their customers for all operating costs, including maintaining their physical plants and providing other necessary support services (e.g., human resources office, finance and accounting support). Other labs/centers (e.g., Air Force) are institutionally funded; that is, they receive most of their funding as direct appropriations from Congress and use these funds for operating support costs as well as for research. In addition, most institutionally funded labs/centers are tenants on larger military bases and receive their support services at reduced or no charge from their host. Even those that own their own facilities receive separate funding support services and do not charge their customers for these overhead costs. Efforts are underway to institute common business practices across the DOD RDT&E labs, but until that occurs comparisons may be misleading.

### DEFINITIONS

Note: In FY92 and previous years a different numbering scheme was used to label budget activity categories.

**6.1 ILIR** - This is the total obligation authority for In-House Laboratory Independent Research 6.1 program elements (Navy PE=0601152N).

**6.1 Other In-House/Out-of-House** - This is the total obligation authority for Basic Research 6.1 program elements conducted In-House (excluding ILIR) or Out-of-House

**6.2 IED In-House/Out-of-House (for Navy only)** - This is the total obligation authority for Innovative Exploratory Development 6.2 (Navy PE=0602936N) program elements conducted In-House/Out-of-House (Eliminated after FY 93).

**6.2 Other In-House/Out-of-House** - This is the total obligation Authority for Exploratory Development/Applied Research 6.2 program elements conducted In-House (excluding IED)/Out-of-House (excluding IED).

**6.3 (previously 6.3A) In-House/Out-of-House** - This is the total obligation authority for Advanced Development 6.3 program elements conducted In-House/Out-of-House.

**6.4 (previously 6.3B) In-House/Out-of-House** - This is the total obligation authority for Demonstration and Validation (Dem/Val) 6.4 program elements conducted In-House/Out-of-House.

## APPENDIX B

### DEFINITIONS OF REPORT ELEMENTS

**6.5 (previously 6.4) In-House/Out-of-House** - This is the total obligation authority for Engineering and Manufacturing Development (EMD) 6.5 program elements conducted In-House/Out-of-House.

**6.6 (previously 6.5) In-House/Out-of-House** - This is the total obligation authority for RDT&E Management Support 6.6 program elements conducted In-House/Out-of-House.

**6.7 In-House/Out-of-House** - This is the total obligation authority for all Operational Systems Development (OSD) 6.7 with RDT&E funds conducted In-House/Out-of-House. This item is interpreted in its broadest sense to include operational developments outside the systems areas, and not included in any of the above categories.

**Acres** - This is the total number of acres owned and/or acres leased from other than DOD activities. Included is land which is public domain. In cases involving tenants who are also R&D Activities, the tenants will have indicated only the acreage occupied solely by them. The owning Activity will account for the remainder including any acreage occupied by non-R&D tenants. This amount excludes all easements and permits, and is rounded to the nearest acre.

**End Strength, Military/Civilian** - This is the total year end strength, for both officer and enlisted military personnel and civilians (including foreign nationals). Summer hires, co-ops, students, and patients are excluded.

**Equipment - Property Acquisition Cost** - This is the total acquisition cost of all "personal property" equipment, which includes the cost of installed equipment directly related to mission execution, such as lab test equipment. This total includes the acquisition cost of new scientific and engineering equipment. Each reporting Activity is responsible for reporting this information for those facilities assigned to or occupied and utilized by it. An R&D owner does not report this information for the facilities assigned to or occupied by its R&D tenants, as tenants report this information separately.

**Note:** Installed equipment reported under **Real Property - Property Acquisition Cost** is not included here.

**In-House Obligations** - Obligations reported under this category are for activities performed, or to be performed, by the organizational entity. The work is carried out directly by their own personnel. In addition to personnel costs, also included under In-House are the costs of supplies and equipment essentially of an off-the-shelf nature that are procured for In-House research and development, plus such things as travel, publications, and other types of services in support of In-House functions.

Except for the Navy, personnel expenses for planning and administering contracts and grants for Out-of-House work are generally excluded from the In-House entity total. For Navy Activities, In-

## APPENDIX B DEFINITIONS OF REPORT ELEMENTS

House includes all direct (i.e., customer-funded, mission-oriented) labor, direct material, direct travel, equipment, direct computer support, other direct support services, and all overhead.

**In-House RDT&E Activities** - These Activities are organizational entities which perform at least 25% of their work in any or all of the categories of research, development, test and evaluation (RDT&E). In addition, at least 25% of an Activity's In-House manpower and/or 25% of the obligation authority used In-House is devoted to one or more of the categories of RDT&E.

**MILCON** - This is the total obligation authority for Military Construction appropriations.

**New Capital Equipment - Property Acquisition Cost** - This is the total acquisition cost for new capital equipment (i.e., installed physical plant equipment such as HVAC) acquired in FY95. This amount is also included in the total entry for **Real Property - Property Acquisition Cost**.

**New Scientific & Engineering Equipment - Property Acquisition Cost** - This is the total acquisition cost for new scientific and engineering equipment acquired in FY95, including the cost of newly installed equipment directly related to mission execution, such as lab test equipment. This amount is also included in the total entry for **Equipment - Property Acquisition Cost**.

**Non-DOD In-House/Out-of-House** - This is total obligation authority for all RDTE In-House/Out-of-House not reported under 6.1-6.7, as defined above, including non-Defense funds for work which is conducted In-house/Out-of-House.

**Obligation Authority** - Authority for the financial resources available for obligation in the specific year being reported. This includes unobligated authority carried forward from the prior year and all obligation authority received or made available for obligation in the year being reported, including the unobligated authority which will be carried forward into the following year.

**O&M/Operations & Maintenance In-House/Out-of-House** - This is the total obligation authority for Operations and Maintenance appropriations In-House/Out-of-House, regardless of source.

**Other In-House/Out-of-House** - This is the total obligation authority for all "other" (i.e., not reported elsewhere) appropriations In-House/Out-of-House, regardless of source.

**Out-Of-House Obligations** - Obligations reported under this category are for activities performed, or to be performed, by other than the organizational entity. Out-of-House performers may include other departmental or DOD organizational entities, industrial firms, educational institutions, not-for-profit institutions, and private individuals. Included as Out-of-House work are all expenses paid the Out-of-House performers.

Except for the Navy, the expenses incurred in planning and administering Out-of-House programs by personnel of the organizational entity are generally also included in Out-of-House. This would

## APPENDIX B

### DEFINITIONS OF REPORT ELEMENTS

also include travel and other supporting services. For Navy Activities, Out-of-House includes only direct (i.e., customer-funded, mission-oriented) work performed by other than the reporting organizational entity. All overhead is also excluded from this category by the Navy.

**Procurement In-House/Out-of-House** - This is the total obligation authority for procurement appropriations In-House/Out-of-House regardless of source.

**RDT&E** - The sum of the total obligation authority, regardless of source, for both In-House and Out-of-House funding for the following categories:

- ILIR 6.1
- Basic Research 6.1
- Innovative Exploratory Development (Navy Only;pre-FY94) 6.2
- Exploratory Development/Applied Research 6.2
- Advanced Development 6.3
- Demonstration and Validation (Dem/Val) 6.4
- Engineering and Manufacturing Development (EMD) 6.5
- RDT&E Management Support 6.6
- Operational Systems Development 6.7
- Non-DOD

**Real Property - Property Acquisition Cost** - This is the total acquisition cost of all land, buildings and capital equipment, including the cost of installed physical plant equipment such as HVAC (in excess of \$200) and improvements. This total includes the acquisition cost of new capital equipment. Each reporting Activity is responsible for reporting this information for those facilities assigned to, or leased or occupied by it. An R&D owner will not report this information for the facilities assigned to or occupied by its R&D tenants, as they must report this information separately. This total does not include acreage or real property in buildings rented from private owners.

**Scientists and Engineers (S&E)** - This generally includes full-time professional Government scientific and engineering civilian personnel actively engaged in RDT&E activities. It also includes military professionals, both officer and enlisted, actively engaged in RDT&E activities. Lawyers, accountants, chaplains, social workers, and educators should be excluded.

**PhD's, Military/Civilian** - This is the total number of military (officer and enlisted) and civilian scientists and engineers whose most advanced degree is a doctorate. Degrees must be earned from an accredited college or university. Honorary degrees are excluded.

**Other, Military/Civilian** - This is the total number of military (officer and enlisted) and civilian scientists and engineers who do not hold a doctorate degree, but who are considered professionals. Professionals include full-time Government scientific and

**APPENDIX B  
DEFINITIONS OF REPORT ELEMENTS**

engineering personnel actively engaged in RDTE activities. Lawyers, accountants, chaplains, social workers and educators are excluded.

**Space, Admin** - This is the total number of square feet of building space determined to be administrative space (usually that portion occupied by the headquarters staff and excludes scientists, or engineering offices in a laboratory). Each reporting Activity is responsible for reporting this information for those facilities assigned to, or leased, or occupied by it.

**Space, Lab** - This is the total number of square feet of building space determined to be laboratory space. Each reporting Activity is responsible for reporting this information for those facilities assigned to, or leased, or occupied by it.

**Space, Other** - This is the total number of square feet of all remaining building space. Each reporting Activity is responsible for reporting this information for those facilities assigned to, leased, or occupied by it.

**Technical Support and Other Personnel** - This generally includes non-professionals working on an RDT&E project or program in support of a professional. In the case of civilians, it includes, but is not limited to, those holding positions that fall into the Civil Service Occupational Groups and Series of Classes, General Schedule. This grouping also includes professional, administrative and clerical personnel in Federal General Schedule (GS) and Wage Grade (WG) positions who provide support services in such areas as computers, personnel, technical library, logistics, and facilities.

**Total Funding** - The sum of Total RDT&E, Procurement, Operations & Maintenance and Other.



**APPENDIX B  
DEFINITIONS OF REPORT ELEMENTS**

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## **APPENDIX C**

# **SELECTED STANDARD ABBREVIATIONS AND ACRONYMS**

**APPENDIX C**  
**SELECTED STANDARD ABBREVIATIONS AND ACRONYMS**

<b>AAM</b>	- Air-to-Air Missile
<b>AAW</b>	- Anti-air Warfare
<b>ADKEM</b>	- Advanced Kinetic Energy Missile
<b>ADPE</b>	- Automatic Data-Processing Equipment
<b>AFDTC</b>	- Air Force Development Test Center
<b>AGS</b>	- Armored Gun Systems
<b>AI</b>	- Artificial Intelligence
<b>AMC</b>	- Army Materiel Command
<b>APG</b>	- Aberdeen Proving Ground
<b>ARDEC</b>	- Armament Research, Development and Engineering Center
<b>ARIA</b>	- Advanced Range Instrumentation Aircraft
<b>ASAS</b>	- All Source Analysis System
<b>ASW</b>	- Antisubmarine Warfare
<b>ATCCS</b>	- Army Tactical Command and Control System
<b>ATRJ</b>	- Advanced Technology Radar Jammer
<b>BFVS</b>	- Bradley Fighting Vehicle Systems
<b>BW</b>	- Biological Warfare
<b>C3</b>	- Command, Control and Communications
<b>C3I</b>	- Command, Control, Communications and Intelligence
<b>CAD</b>	- Computer Aided Design
<b>CAE</b>	- Computer Aided Engineering
<b>CAM</b>	- Computer Aided Manufacturing
<b>CB</b>	- Chemical Biological
<b>CBR</b>	- Chemical, Biological, Radiological
<b>CE</b>	- Chief of Engineers-Army
<b>CECOM</b>	- Communications and Electronics Command
<b>CG</b>	- Commanding General
<b>CIGTF</b>	- Central Inertial Guidance Test Facility
<b>CM</b>	- Countermeasures
<b>CMMCA</b>	- Cruise Missile Mission Control Aircraft
<b>CNO</b>	- Chief of Naval Operations
<b>CRADA</b>	- Cooperative Research and Development Agreement
<b>CRREL</b>	- Cold Regions Research and Engineering Laboratory
<b>CW</b>	- Chemical Warfare
<b>CWA</b>	- Chemical Warfare Agents
<b>DA</b>	- Department of the Army
<b>DARPA</b>	- Defense Advanced Research Projects Agency
<b>DART</b>	- Demonstration of Advanced Radar Technology
<b>DDN</b>	- Defense Data Network
<b>DIRCM</b>	- Directional Infrared Countermeasures
<b>DoD</b>	- Department of Defense
<b>DPG</b>	- Dugway Proving Ground
<b>ECCM</b>	- Electronic Counter-Countermeasures
<b>ECCM/ARTB</b>	- Electronic Counter-Countermeasures/Advanced Radar Test Bed

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<b>ECM</b>	-	Electronic Countermeasures
<b>ECWCS</b>	-	Extended Cold Weather Clothing System
<b>EDDIC</b>	-	Experimental Design, Demonstration and Integration Center
<b>ELINT</b>	-	Electronic Intelligence
<b>EMI</b>	-	Electromagnetic Interference
<b>EMP</b>	-	Electromagnetic Propagation
<b>EMW</b>	-	Electromagnetic Warfare
<b>EO</b>	-	Electro-Optical
<b>EO-IR</b>	-	Electro-Optics/Infrared
<b>EOD</b>	-	Explosive Ordnance Disposal
<b>EPLRS</b>	-	Enhanced Position Location Reporting System
<b>ET</b>	-	Engineering Artillery
<b>ETDL</b>	-	Electronics Technology and Devices Laboratory
<b>EW</b>	-	Electronic Warfare
<b>EWTES</b>	-	Electronic Warfare Threat Environment Simulation
<b>EWVA</b>	-	Electronic Warfare Vulnerability Assessments
<b>FA</b>	-	Field Artillery
<b>FAADS</b>	-	Forward Area Air Defense Systems
<b>GCA</b>	-	Ground-Controlled Approach
<b>GPS</b>	-	Global Positioning System
<b>HF</b>	-	High-Frequency
<b>HFE</b>	-	Human Factors Engineering
<b>HIFX</b>	-	High Intensity Flash X-ray
<b>HPM</b>	-	High Powered Microwaves
<b>IDF</b>	-	Integrated Data Facility
<b>IED</b>	-	Innovative Exploratory Development
<b>IEW</b>	-	Intelligence Electronic Warfare
<b>IFAST</b>	-	Integration Facility for Avionics System Test
<b>IFF</b>	-	Identification, Friend or Foe
<b>IIPF</b>	-	Intelligence Information Processing Facility
<b>ILIR</b>	-	In-Lab Innovative Research
<b>IM</b>	-	Insensitive Munitions
<b>IR</b>	-	Infrared
<b>IRCM</b>	-	Infrared Countermeasures
<b>JDAM</b>	-	Joint Direct Attack Munitions
<b>JSOW</b>	-	Joint Standoff Weapon
<b>JTIDS</b>	-	Joint Tactical Information Distribution System
<b>LEAP</b>	-	Lightweight Exo-Atmospheric Projectile
<b>LMCA</b>	-	Logistics Material Control Activity
<b>MIRCL</b>	-	Mid-Infrared Chemical Laser
<b>MPT</b>	-	Military Potential Test
<b>MRSR</b>	-	Multi-Role Survivable Radar
<b>MSMS</b>	-	Molten Salt Melt Structure
<b>NASC</b>	-	Naval Air Systems Command

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**SELECTED STANDARD ABBREVIATIONS AND ACRONYMS**

<b>NASP</b>	-	National Aerospace Plane
<b>NAVAIR</b>	-	Naval Air Systems Command
<b>NAVSEA</b>	-	Naval Sea Systems Command
<b>NBC</b>	-	Nuclear, Biological and Chemical
<b>NCAC</b>	-	National Center for Advanced Computing
<b>NDT</b>	-	Non-Destructive Testing
<b>NEMP</b>	-	Nuclear Electromagnetic Propagation
<b>NTC</b>	-	National Training Center
<b>NVD</b>	-	Night Vision Devices
<b>OPTEC</b>	-	Operational, Test and Evaluation Command
<b>PEO</b>	-	Program Executive Officer
<b>PI</b>	-	Product Improvement
<b>PLS</b>	-	Palletized Load System
<b>PM</b>	-	Program Manager
<b>PMEL</b>	-	Precision Measurement Equipment Laboratory
<b>POL</b>	-	Petroleum, Oil, Lubricants
<b>QA</b>	-	Quality Assurance
<b>QMDO</b>	-	Qualitative Material Development
<b>R&amp;D</b>	-	Research and Development
<b>RDT&amp;E</b>	-	Research, Development, Test and Evaluation
<b>RESA</b>	-	Research Evaluation and Systems Analysis
<b>RF</b>	-	Radio Frequency
<b>RFPI</b>	-	Rapid Force Projection Initiative
<b>SADARM</b>	-	Sense and Destroy Armor
<b>SDI</b>	-	Strategic Defense Initiative
<b>SLED</b>	-	Standard Linear Energy Doubler
<b>STAR</b>	-	Systems Test bed for Avionics Research
<b>T&amp;E</b>	-	Test and Evaluation
<b>TACOM</b>	-	Tank Automotive Command
<b>TAOS</b>	-	Technology for Autonomous Operational Survivability
<b>TASS</b>	-	Tactical Avionics Simulator
<b>TECOM</b>	-	Test and Evaluation Command
<b>TMAS</b>	-	Tank Main Armament System
<b>TRADOC</b>	-	Training and Indoctrination Command
<b>UDT</b>	-	Underwater Demolition Team
<b>USW</b>	-	Undersea Warfare
<b>UV</b>	-	Ultraviolet
<b>V/STOL</b>	-	Vertical/Short Takeoff and Landing
<b>VHF</b>	-	Very High Frequency

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